

# CPC COOPERATIVE PATENT CLASSIFICATION

## G PHYSICS (NOTES omitted)

### INSTRUMENTS

## G06 COMPUTING; CALCULATING; COUNTING (NOTES omitted)

## G06F ELECTRIC DIGITAL DATA PROCESSING (computer systems based on specific computational models [G06N](#))

### NOTE

In this subclass, the following terms or expressions are used with the meaning indicated:

- "handling" includes processing or transporting of data;
- "data processing equipment" means an association of an electric digital data processor classifiable under group [G06F 7/00](#), with one or more arrangements classifiable under groups [G06F 1/00](#) - [G06F 5/00](#) and [G06F 9/00](#) - [G06F 13/00](#).

### WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
 

<a href="#">G06F 3/18</a>	covered by	<a href="#">G06F 3/00</a> , <a href="#">G06K 11/00</a>
<a href="#">G06F 7/04</a>	covered by	<a href="#">G06F 7/02</a>
<a href="#">G06F 9/302</a> - <a href="#">G06F 9/318</a>	covered by	<a href="#">G06F 9/30</a>
- In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>1/00</b>	<b>Details not covered by groups</b> <a href="#">G06F 3/00</a> - <a href="#">G06F 13/00</a> and <a href="#">G06F 21/00</a> (architectures of general purpose stored program computers <a href="#">G06F 15/76</a> )	<b>1/0335</b>	. . . . . {the phase increment itself being a composed function of two or more variables, e.g. frequency and phase}
<b>1/02</b>	. Digital function generators	<b>1/0342</b>	. . . . . {for generating simultaneously two or more related waveforms, e.g. with different phase angles only}
<b>1/022</b>	. . {Waveform generators, i.e. devices for generating periodical functions of time, e.g. direct digital synthesizers ( <a href="#">G06F 1/025</a> , <a href="#">G06F 1/03</a> take precedence)}	<b>1/035</b>	. . . Reduction of table size {( <a href="#">G06F 1/0314</a> takes precedence)}
<b>1/025</b>	. . for functions having two-valued amplitude, e.g. Walsh functions	<b>1/0353</b>	. . . . . {by using symmetrical properties of the function, e.g. using most significant bits for quadrant control}
<b>1/0255</b>	. . . {Walsh or analogous functions}	<b>1/0356</b>	. . . . . {by using two or more smaller tables, e.g. addressed by parts of the argument}
<b>1/03</b>	. . working, at least partly, by table look-up ( <a href="#">G06F 1/025</a> takes precedence)	<b>1/04</b>	. Generating or distributing clock signals or signals derived directly therefrom
	<b><u>NOTE</u></b>	<b>1/06</b>	. . Clock generators producing several clock signals {( <a href="#">G06F 1/08</a> - <a href="#">G06F 1/14</a> take precedence)}
	In order to be classified in this group, the table must contain function values of the desired or an intermediate function, not merely coefficients.	<b>1/08</b>	. . Clock generators with changeable or programmable clock frequency
<b>1/0307</b>	. . . {Logarithmic or exponential functions ( <a href="#">G06F 1/0314</a> , <a href="#">G06F 1/035</a> take precedence)}	<b>1/10</b>	. . Distribution of clock signals {, e.g. skew}
<b>1/0314</b>	. . . {the table being stored on a peripheral device, e.g. papertape, drum}	<b>1/105</b>	. . . {in which the distribution is at least partially optical}
<b>1/0321</b>	. . . {Waveform generators, i.e. devices for generating periodical functions of time, e.g. direct digital synthesizers ( <a href="#">G06F 1/0314</a> , <a href="#">G06F 1/035</a> take precedence)}	<b>1/12</b>	. . Synchronisation of different clock signals {provided by a plurality of clock generators}
<b>1/0328</b>	. . . . {in which the phase increment is adjustable, e.g. by using an adder-accumulator}	<b>1/14</b>	. . Time supervision arrangements, e.g. real time clock
		<b>1/16</b>	. Constructional details or arrangements

- 1/1601 . . . {Constructional details related to the housing of computer displays, e.g. of CRT monitors, of flat displays ([constructional details related to flat displays integrated in a portable computer, e.g. laptop, handheld computer G06F 1/1637; constructional details related to television receivers H04N 5/64](#))}
- 1/1603 . . . {Arrangements to protect the display from incident light, e.g. hoods}
- 1/1605 . . . {Multimedia displays, e.g. with integrated or attached speakers, cameras, microphones}
- 1/1607 . . . {Arrangements to support accessories mechanically attached to the display housing ([G06F 1/1603](#), [G06F 1/1605](#) take precedence)}
- 1/1609 . . . . {to support filters or lenses}
- 1/1611 . . . . {to support document holders}
- 1/1613 . . . {for portable computers ([cooling arrangements therefor G06F 1/203; constructional details or arrangements for pocket calculators, electronic agendas or books G06F 15/0216; constructional details of portable telephone sets: with several bodies H04M 1/0202](#))}
- 1/1615 . . . {with several enclosures having relative motions, each enclosure supporting at least one I/O or computing function ([constructional details of portable telephones comprising a plurality of mechanically joined movable body parts H04M 1/0206](#))}
- 1/1616 . . . . {with folding flat displays, e.g. laptop computers or notebooks having a clamshell configuration, with body parts pivoting to an open position around an axis parallel to the plane they define in closed position}
- 1/1618 . . . . {the display being foldable up to the back of the other housing with a single degree of freedom, e.g. by 360° rotation over the axis defined by the rear edge of the base enclosure}
- 1/162 . . . . {changing, e.g. reversing, the face orientation of the screen with a two degrees of freedom mechanism, e.g. for folding into tablet PC like position or orienting towards the direction opposite to the user to show to a second user}
- 1/1622 . . . . {with enclosures rotating around an axis perpendicular to the plane they define or with ball-joint coupling, e.g. PDA with display enclosure orientation changeable between portrait and landscape by rotation with respect to a coplanar body enclosure}
- 1/1624 . . . . {with sliding enclosures, e.g. sliding keyboard or display}
- 1/1626 . . . {with a single-body enclosure integrating a flat display, e.g. Personal Digital Assistants [PDAs]}
- 1/1628 . . . {Carrying enclosures containing additional elements, e.g. case for a laptop and a printer}
- 1/163 . . . {Wearable computers, e.g. on a belt}
- 1/1632 . . . {External expansion units, e.g. docking stations}
- 1/1633 . . . {Constructional details or arrangements of portable computers not specific to the type of enclosures covered by groups [G06F 1/1615](#) - [G06F 1/1626](#)}
- 1/1635 . . . . {Details related to the integration of battery packs and other power supplies such as fuel cells or integrated AC adapter}
- 1/1637 . . . . {Details related to the display arrangement, including those related to the mounting of the display in the housing}
- 1/1639 . . . . . {the display being based on projection}
- 1/1641 . . . . . {the display being formed by a plurality of foldable display components ([G06F 1/1647](#) takes precedence)}
- 1/1643 . . . . . {the display being associated to a digitizer, e.g. laptops that can be used as penpads ([details related to the relative motion of the display enclosure with respect to the body enclosure, e.g. to move between laptop and tablet PC configuration G06F 1/1615](#))}
- 1/1645 . . . . . {the display being suitable to be used in combination with an external overhead projector}
- 1/1647 . . . . . {including at least an additional display ([G06F 1/1692](#) takes precedence)}
- 1/1649 . . . . . {the additional display being independently orientable, e.g. for presenting information to a second user}
- 1/165 . . . . . {the additional display being small, e.g. for presenting status information}
- 1/1652 . . . . . {the display being flexible, e.g. mimicking a sheet of paper, or rollable}
- 1/1654 . . . . . {the display being detachable, e.g. for remote use}
- 1/1656 . . . . {Details related to functional adaptations of the enclosure, e.g. to provide protection against EMI, shock, water, or to host detachable peripherals like a mouse or removable expansions units like PCMCIA cards, or to provide access to internal components for maintenance or to removable storage supports like CDs or DVDs, or to mechanically mount accessories ([mounting of accessories to a computer display G06F 1/1607; display hoods G06F 1/1603; cooling arrangements for portable computers G06F 1/203](#))}
- 1/1658 . . . . . {related to the mounting of internal components, e.g. disc drive or any other functional module}
- 1/166 . . . . . {related to integrated arrangements for adjusting the position of the main body with respect to the supporting surface, e.g. legs for adjusting the tilt angle}
- 1/1662 . . . . {Details related to the integrated keyboard}
- 1/1664 . . . . . {Arrangements for ergonomically adjusting the disposition of keys of the integrated keyboard}
- 1/1666 . . . . . {Arrangements for reducing the size of the integrated keyboard for transport, e.g. foldable keyboards, keyboards with collapsible keys ([G06F 1/1664](#) takes precedence)}
- 1/1667 . . . . . {Arrangements for adjusting the tilt angle of the integrated keyboard independently from the main body ([adjusting the tilt angle integrally with the main body G06F 1/166](#))}
- 1/1669 . . . . . {Detachable keyboards}

- 1/1671 . . . . . {Special purpose buttons or auxiliary keyboards, e.g. retractable mini keypads, keypads or buttons that remain accessible at closed laptop ([G06F 1/1666 takes precedence](#))}
- 1/1673 . . . . . {Arrangements for projecting a virtual keyboard}
- 1/1675 . . . . . {Miscellaneous details related to the relative movement between the different enclosures or enclosure parts}
- 1/1677 . . . . . {for detecting open or closed state or particular intermediate positions assumed by movable parts of the enclosure, e.g. detection of display lid position with respect to main body in a laptop, detection of opening of the cover of battery compartment}
- 1/1679 . . . . . {for locking or maintaining the movable parts of the enclosure in a fixed position, e.g. latching mechanism at the edge of the display in a laptop or for the screen protective cover of a PDA ([G06F 1/1681 takes precedence](#))}
- 1/1681 . . . . . {Details related solely to hinges ([hinge details related to the transmission of signals or power are classified in G06F 1/1683](#))}
- 1/1683 . . . . . {for the transmission of signal or power between the different housings, e.g. details of wired or wireless communication, passage of cabling}
- 1/1684 . . . . . {Constructional details or arrangements related to integrated I/O peripherals not covered by groups [G06F 1/1635 - G06F 1/1675](#)}
- 1/1686 . . . . . {the I/O peripheral being an integrated camera}
- 1/1688 . . . . . {the I/O peripheral being integrated loudspeakers}
- 1/169 . . . . . {the I/O peripheral being an integrated pointing device, e.g. trackball in the palm rest area, mini-joystick integrated between keyboard keys, touch pads or touch stripes ([G06F 1/1643 takes precedence; constructional details of pointing devices G06F 3/033](#))}
- 1/1692 . . . . . {the I/O peripheral being a secondary touch screen used as control interface, e.g. virtual buttons or sliders}
- 1/1694 . . . . . {the I/O peripheral being a single or a set of motion sensors for pointer control or gesture input obtained by sensing movements of the portable computer}
- 1/1696 . . . . . {the I/O peripheral being a printing or scanning device}
- 1/1698 . . . . . {the I/O peripheral being a sending/receiving arrangement to establish a cordless communication link, e.g. radio or infrared link, integrated cellular phone ([details of antennas disposed inside a computer H01Q 1/2266](#))}
- 1/18 . . . Packaging or power distribution
- 1/181 . . . {Enclosures ([for portable computers G06F 1/1613](#))}
- 1/182 . . . . . {with special features, e.g. for use in industrial environments; grounding or shielding against radio frequency interference [RFI] or electromagnetic interference [EMI]}
- 1/183 . . . {Internal mounting support structures, e.g. for printed circuit boards, internal connecting means ([for buses G06F 13/409](#))}
- 1/184 . . . . . {Mounting of motherboards}
- 1/185 . . . . . {Mounting of expansion boards}
- 1/186 . . . . . {Securing of expansion boards in correspondence to slots provided at the computer enclosure}
- 1/187 . . . . . {Mounting of fixed and removable disk drives}
- 1/188 . . . . . {Mounting of power supply units}
- 1/189 . . . {Power distribution}
- 1/20 . . . Cooling means
- 1/203 . . . {for portable computers, e.g. for laptops}
- 1/206 . . . {comprising thermal management}
- 1/22 . . . Means for limiting or controlling the pin/gate ratio
- 1/24 . . . Resetting means
- 1/26 . . . Power supply means, e.g. regulation thereof ([for memories G11C](#))
- 1/263 . . . {Arrangements for using multiple switchable power supplies, e.g. battery and AC ([G06F 1/30 takes precedence](#))}
- 1/266 . . . {Arrangements to supply power to external peripherals either directly from the computer or under computer control, e.g. supply of power through the communication port, computer controlled power-strips}
- 1/28 . . . Supervision thereof, e.g. detecting power-supply failure by out of limits supervision
- 1/30 . . . Means for acting in the event of power-supply failure or interruption, e.g. power-supply fluctuations ([for resetting only G06F 1/24](#))
- 1/305 . . . {in the event of power-supply fluctuations}
- 1/32 . . . Means for saving power
- 1/3203 . . . Power management, i.e. event-based initiation of a power-saving mode
- 1/3206 . . . . . Monitoring of events, devices or parameters that trigger a change in power modality
- 1/3209 . . . . . Monitoring remote activity, e.g. over telephone lines or network connections
- 1/3212 . . . . . Monitoring battery levels, e.g. power saving mode being initiated when battery voltage goes below a certain level
- 1/3215 . . . . . Monitoring of peripheral devices
- 1/3218 . . . . . of display devices
- 1/3221 . . . . . of disk drive devices
- 1/3225 . . . . . of memory devices
- 1/3228 . . . . . Monitoring task completion, e.g. by use of idle timers, stop commands or wait commands
- 1/3231 . . . . . Monitoring the presence, absence or movement of users
- 1/3234 . . . . . Power saving characterised by the action undertaken
- 1/3237 . . . . . by disabling clock generation or distribution
- 1/324 . . . . . by lowering clock frequency
- 1/3243 . . . . . {Power saving in microcontroller unit}
- 1/3246 . . . . . by software initiated power-off

- 1/325 . . . . . {Power saving in peripheral device}
- 1/3253 . . . . . {Power saving in bus}
- 1/3256 . . . . . {Power saving in optical drive}
- 1/3259 . . . . . {Power saving in cursor control device, e.g. mouse, joystick, trackball}
- 1/3262 . . . . . {Power saving in digitizer or tablet}
- 1/3265 . . . . . {Power saving in display device}
- 1/3268 . . . . . {Power saving in hard disk drive}
- 1/3271 . . . . . {Power saving in keyboard}
- 1/3275 . . . . . {Power saving in memory, e.g. RAM, cache}
- 1/3278 . . . . . {Power saving in modem or I/O interface}
- 1/3281 . . . . . {Power saving in PCMCIA card}
- 1/3284 . . . . . {Power saving in printer}
- 1/3287 . . . . . by switching off individual functional units in the computer system
- 1/329 . . . . . by task scheduling
- 1/3293 . . . . . by switching to a less power-consuming processor, e.g. sub-CPU
- 1/3296 . . . . . by lowering the supply or operating voltage
- 3/00 Input arrangements for transferring data to be processed into a form capable of being handled by the computer; Output arrangements for transferring data from processing unit to output unit, e.g. interface arrangements**
- 3/002 . {Specific input/output arrangements not covered by [G06F 3/02](#) - [G06F 3/16](#), e.g. facsimile, microfilm (facsimile *per se* [H04N 1/00](#); viewers photographic printing [G03B](#); electrography, magnetography [G03G](#); other optical apparatus [G02B 27/00](#))}
- 3/005 . . {Input arrangements through a video camera}
- 3/007 . {Digital input from or digital output to memories of the shift register type, e.g. magnetic bubble memories, CCD memories (magnetic bubble memories *per se* [G11C 19/08](#), CCD memories *per se* [G11C 19/28](#))}
- 3/01 . Input arrangements or combined input and output arrangements for interaction between user and computer ([G06F 3/16](#) takes precedence)
- 3/011 . . {Arrangements for interaction with the human body, e.g. for user immersion in virtual reality (for handicapped people in general [A61F 4/00](#); robot control [B25J](#); tactile signalling [G08B](#); blind teaching [G09B 21/00](#); for electrophonic musical instruments [G10H 1/344](#); electronic switches characterised by the way in which the control signals are generated [H03K 17/94](#))}
- 3/012 . . . {Head tracking input arrangements}
- 3/013 . . . {Eye tracking input arrangements ([G06F 3/015](#) takes precedence)}
- 3/014 . . . {Hand-worn input/output arrangements, e.g. data gloves}
- 3/015 . . . {Input arrangements based on nervous system activity detection, e.g. brain waves [EEG] detection, electromyograms [EMG] detection, electrodermal response detection}
- 3/016 . . {Input arrangements with force or tactile feedback as computer generated output to the user}
- 3/017 . . {Gesture based interaction, e.g. based on a set of recognized hand gestures (interaction based on gestures traced on a digitiser [G06F 3/04883](#))}
- 3/018 . . {Input/output arrangements for oriental characters}
- 3/02 . . Input arrangements using manually operated switches, e.g. using keyboards or dials
- 3/0202 . . . {Constructional details or processes of manufacture of the input device}
- 3/0205 . . . . {Lever arrangements for operating keyboard cursor control keys in a joystick-like manner}
- 3/0208 . . . . {Arrangements for adjusting the tilt angle of a keyboard, e.g. pivoting legs (for keyboards integrated in a laptop computer [G06F 1/1667](#))}
- 3/021 . . . . {Arrangements integrating additional peripherals in a keyboard, e.g. card or barcode reader, optical scanner}
- 3/0213 . . . . . {Arrangements providing an integrated pointing device in a keyboard, e.g. trackball, mini-joystick (for pointing devices integrated in a laptop computer [G06F 1/169](#); joysticks [G05G 9/047](#); constructional details of pointing devices [G06F 3/033](#))}
- 3/0216 . . . . {Arrangements for ergonomically adjusting the disposition of keys of a keyboard (for keyboards integrated in a laptop computer [G06F 1/1664](#))}
- 3/0219 . . . . {Special purpose keyboards}
- 3/0221 . . . . {Arrangements for reducing keyboard size for transport or storage, e.g. foldable keyboards, keyboards with collapsible keys ([G06F 3/0216](#) takes precedence; for keyboards integrated in a laptop computer [G06F 1/1666](#))}
- 3/0224 . . . . {Key guide holders}
- 3/0227 . . . {Cooperation and interconnection of the input arrangement with other functional units of a computer ([G06F 3/023](#) - [G06F 3/037](#) take precedence)}
- 3/023 . . . Arrangements for converting discrete items of information into a coded form, e.g. arrangements for interpreting keyboard generated codes as alphanumeric codes, operand codes or instruction codes
- 3/0231 . . . . {Cordless keyboards}
- 3/0232 . . . . {Manual direct entries, e.g. key to main memory}
- 3/0233 . . . . {Character input methods}
- 3/0234 . . . . . {using switches operable in different directions}
- 3/0235 . . . . . {using chord techniques ([G06F 3/0234](#) takes precedence)}
- 3/0236 . . . . . {using selection techniques to select from displayed items}
- 3/0237 . . . . . {using prediction or retrieval techniques}
- 3/0238 . . . . {Programmable keyboards (key guide holders [G06F 3/0224](#))}
- 3/027 . . . . for insertion of decimal point {(display of decimal point [G06F 3/1407](#); complete desk-top or hand- held calculators [G06F 15/02](#))}



- 3/03 . . . Arrangements for converting the position or the displacement of a member into a coded form
- NOTE**
- In this group, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 3/0304 . . . {Detection arrangements using opto-electronic means (constructional details of pointing devices not related to the detection arrangement using opto-electronic means [G06F 3/033](#) and subgroups; optical digitisers [G06F 3/042](#))}
- 3/0308 . . . . {comprising a plurality of distinctive and separately oriented light emitters or reflectors associated to the pointing device, e.g. remote cursor controller with distinct and separately oriented LEDs at the tip whose radiations are captured by a photo-detector associated to the screen}
- 3/0312 . . . . {for tracking the rotation of a spherical or circular member, e.g. optical rotary encoders used in mice or trackballs using a tracking ball or in mouse scroll wheels (tracking relative movement in co-operation with a regularly or irregularly patterned surface, e.g. as in optical mice [G06F 3/0317](#); constructional details of scroll or thumb-wheels [G06F 3/0362](#); optical rotary encoders [G01D 5/3473](#); thumb wheel switches [H01H 19/001](#))}
- 3/0317 . . . . {in co-operation with a patterned surface, e.g. absolute position or relative movement detection for an optical mouse or pen positioned with respect to a coded surface}
- 3/0321 . . . . . {by optically sensing the absolute position with respect to a regularly patterned surface forming a passive digitiser, e.g. pen optically detecting position indicative tags printed on a paper sheet (constructional details of pen-shaped pointing devices [G06F 3/03545](#), [G06F 3/03542](#), [G06F 3/037](#))}
- 3/0325 . . . . {using a plurality of light emitters or reflectors or a plurality of detectors forming a reference frame from which to derive the orientation of the object, e.g. by triangulation or on the basis of reference deformation in the picked up image}
- 3/033 . . . Pointing devices displaced or positioned by the user, e.g. mice, trackballs, pens or joysticks; Accessories therefor (digitisers characterised by the transducing means [G06F 3/041](#))
- 3/0334 . . . . {Foot operated pointing devices}
- 3/0338 . . . . with detection of limited linear or angular displacement of an operating part of the device from a neutral position, e.g. isotonic or isometric joysticks
- 3/0346 . . . . with detection of the device orientation or free movement in a 3D space, e.g. 3D mice, 6-DOF [six degrees of freedom] pointers using gyroscopes, accelerometers or tilt-sensors
- 3/0354 . . . . with detection of 2D relative movements between the device, or an operating part thereof, and a plane or surface, e.g. 2D mice, trackballs, pens or pucks
- 3/03541 . . . . . {Mouse/trackball convertible devices, in which the same ball is used to track the 2D relative movement}
- 3/03542 . . . . . {Light pens for emitting or receiving light}
- 3/03543 . . . . . {Mice or pucks ([G06F 3/03541](#) takes precedence)}
- 3/03544 . . . . . {having dual sensing arrangement, e.g. two balls or two coils used to track rotation of the pointing device}
- 3/03545 . . . . . {Pens or stylus}
- 3/03546 . . . . . {using a rotatable ball at the tip as position detecting member}
- 3/03547 . . . . . {Touch pads, in which fingers can move on a surface}
- 3/03548 . . . . . {Sliders, in which the moving part moves in a plane}
- 3/03549 . . . . . {Trackballs ([G06F 3/03541](#) takes precedence)}
- 3/0362 . . . . with detection of 1D translations or rotations of an operating part of the device, e.g. scroll wheels, sliders, knobs, rollers or belts
- 3/037 . . . . using the raster scan of a cathode-ray tube [CRT] for detecting the position of the member, e.g. light pens cooperating with CRT monitors
- 3/038 . . . . Control and interface arrangements therefor, e.g. drivers or device-embedded control circuitry
- 3/0383 . . . . . {Signal control means within the pointing device}
- 3/0386 . . . . . {for light pen}
- 3/039 . . . . Accessories therefor, e.g. mouse pads
- 3/0393 . . . . . {Accessories for touch pads or touch screens, e.g. mechanical guides added to touch screens for drawing straight lines, hard keys overlaying touch screens or touch pads}
- 3/0395 . . . . . {Mouse pads}
- 3/041 . . . Digitisers, e.g. for touch screens or touch pads, characterised by the transducing means
- 3/0412 . . . . {Digitisers structurally integrated in a display}
- 3/0414 . . . . {using force sensing means to determine a position}
- 3/04142 . . . . . {the force sensing means being located peripherally, e.g. disposed at the corners or at the side of a touch sensing plate}
- 3/04144 . . . . . {using an array of force sensing means (position sensing using the local deformation of sensor cells [G06F 3/0447](#))}
- 3/04146 . . . . . {using pressure sensitive conductive elements delivering a boolean signal and located between crossing sensing lines, e.g. located between X and Y sensing line layers}
- 3/0416 . . . . {Control or interface arrangements specially adapted for digitisers}
- 3/04162 . . . . . {for exchanging data with external devices, e.g. smart pens, via the digitiser sensing hardware}

3/04164 . . . . .	{Connections between sensors and controllers, e.g. routing lines between electrodes and connection pads}	3/0441 . . . . .	{using active external devices, e.g. active pens, for receiving changes in electrical potential transmitted by the digitiser, e.g. tablet driving signals}
3/04166 . . . . .	{Details of scanning methods, e.g. sampling time, grouping of sub areas or time sharing with display driving (Synchronisation with the driving of the display or the backlighting unit to avoid interferences generated internally G06F 3/04184)}	3/0442 . . . . .	{using active external devices, e.g. active pens, for transmitting changes in electrical potential to be received by the digitiser}
3/041661 . . . . .	{using detection at multiple resolutions, e.g. coarse and fine scanning; using detection within a limited area, e.g. object tracking window}	3/0443 . . . . .	{using a single layer of sensing electrodes}
3/041662 . . . . .	{using alternate mutual and self-capacitive scanning}	3/0444 . . . . .	{using a single conductive element covering the whole sensing surface, e.g. by sensing the electrical current flowing at the corners}
3/0418 . . . . .	{for error correction or compensation, e.g. based on parallax, calibration or alignment}	3/0445 . . . . .	{using two or more layers of sensing electrodes, e.g. using two layers of electrodes separated by a dielectric layer}
3/04182 . . . . .	{Filtering of noise external to the device and not generated by digitiser components}	3/0446 . . . . .	{using a grid-like structure of electrodes in at least two directions, e.g. using row and column electrodes}
3/04184 . . . . .	{Synchronisation with the driving of the display or the backlighting unit to avoid interferences generated internally}	3/0447 . . . . .	{Position sensing using the local deformation of sensor cells}
3/04186 . . . . .	{Touch location disambiguation}	3/0448 . . . . .	{Details of the electrode shape, e.g. for enhancing the detection of touches, for generating specific electric field shapes, for enhancing display quality}
3/042 . . . . .	by opto-electronic means	3/045 . . . . .	using resistive elements, e.g. single continuous surface or two parallel surfaces put in contact
3/0421 . . . . .	{by interrupting or reflecting a light beam, e.g. optical touch-screen}	3/046 . . . . .	by electromagnetic means
3/0423 . . . . .	{using sweeping light beams, e.g. using rotating or vibrating mirror}	3/047 . . . . .	using sets of wires, e.g. crossed wires
3/0425 . . . . .	{using a single imaging device like a video camera for tracking the absolute position of a single or a plurality of objects with respect to an imaged reference surface, e.g. video camera imaging a display or a projection screen, a table or a wall surface, on which a computer generated image is displayed or projected (tracking a projected light spot to determine a position on a display surface G06F 3/0386)}	3/048 . . . . .	Interaction techniques based on graphical user interfaces [GUI]
3/0426 . . . . .	{tracking fingers with respect to a virtual keyboard projected or printed on the surface (virtual keyboards on touch screens G06F 3/04886)}	<b>NOTE</b>  This group <u>covers</u> subject matter where the focus is placed on the way the user can interact with the displayed data. The mere presence of a standard GUI in the context of the disclosure of a specific software application or a specific device capable of processing data related to its specific function, should be in general classified in the appropriate subclasses related to those software applications or specific devices.	
3/0428 . . . . .	{by sensing at the edges of the touch surface the interruption of optical paths, e.g. an illumination plane, parallel to the touch surface which may be virtual (sensing beam interruptions in a planar beam grid of an optical touch-screen G06F 3/0421)}	3/0481 . . . . .	based on specific properties of the displayed interaction object or a metaphor-based environment, e.g. interaction with desktop elements like windows or icons, or assisted by a cursor's changing behaviour or appearance
3/043 . . . . .	using propagating acoustic waves	3/04812 . . . . .	Interaction techniques based on cursor appearance or behaviour, e.g. being affected by the presence of displayed objects
3/0433 . . . . .	{in which the acoustic waves are either generated by a movable member and propagated within a surface layer or propagated within a surface layer and captured by a movable member}	3/04815 . . . . .	Interaction with a metaphor-based environment or interaction object displayed as three-dimensional, e.g. changing the user viewpoint with respect to the environment or object
3/0436 . . . . .	{in which generating transducers and detecting transducers are attached to a single acoustic waves transmission substrate}	3/04817 . . . . .	using icons (graphical or visual programming using iconic symbols G06F 8/34)
3/044 . . . . .	by capacitive means	3/0482 . . . . .	Interaction with lists of selectable items, e.g. menus
		3/0483 . . . . .	Interaction with page-structured environments, e.g. book metaphor

- 3/0484 . . . for the control of specific functions or operations, e.g. selecting or manipulating an object, an image or a displayed text element, setting a parameter value or selecting a range
- 3/04842 . . . . Selection of displayed objects or displayed text elements ([G06F 3/0482](#) takes precedence)
- 3/04845 . . . . for image manipulation, e.g. dragging, rotation, expansion or change of colour
- 3/04847 . . . . Interaction techniques to control parameter settings, e.g. interaction with sliders or dials
- 3/0485 . . . . Scrolling or panning
- 3/04855 . . . . . Interaction with scrollbars
- 3/0486 . . . . Drag-and-drop
- 3/0487 . . . . using specific features provided by the input device, e.g. functions controlled by the rotation of a mouse with dual sensing arrangements, or of the nature of the input device, e.g. tap gestures based on pressure sensed by a digitiser
- 3/0488 . . . . . using a touch-screen or digitiser, e.g. input of commands through traced gestures
- 3/04883 . . . . . for inputting data by handwriting, e.g. gesture or text
- 3/04886 . . . . . by partitioning the display area of the touch-screen or the surface of the digitising tablet into independently controllable areas, e.g. virtual keyboards or menus
- 3/0489 . . . . . using dedicated keyboard keys or combinations thereof
- 3/04892 . . . . . Arrangements for controlling cursor position based on codes indicative of cursor displacements from one discrete location to another, e.g. using cursor control keys associated to different directions or using the tab key ([arrangements for controlling cursor position based on coordinate signals G06F 3/038](#))
- 3/04895 . . . . . Guidance during keyboard input operation, e.g. prompting
- 3/04897 . . . . . {Special input arrangements or commands for improving display capability}
- 3/05 . . . Digital input using the sampling of an analogue quantity at regular intervals of time {, input from a/d converter or output to d/a converter}

- 3/06 . . . Digital input from or digital output to record carriers {, e.g. RAID, emulated record carriers, networked record carriers}

**WARNING**

Groups [G06F 3/06](#), [G06F 3/0601](#), [G06F 3/0602](#), [G06F 3/0604](#), [G06F 3/0605](#), [G06F 3/0607](#), [G06F 3/0608](#), [G06F 3/061](#), [G06F 3/0611](#), [G06F 3/0613](#), [G06F 3/0614](#), [G06F 3/0616](#), [G06F 3/0617](#), [G06F 3/0619](#), [G06F 3/062](#), [G06F 3/0622](#), [G06F 3/0623](#), [G06F 3/0625](#), [G06F 3/0626](#), [G06F 3/0628](#), [G06F 3/0629](#), [G06F 3/0631](#), [G06F 3/0632](#), [G06F 3/0634](#), [G06F 3/0635](#), [G06F 3/0637](#), [G06F 3/0638](#), [G06F 3/064](#), [G06F 3/0641](#), [G06F 3/0643](#), [G06F 3/0644](#), [G06F 3/0646](#), [G06F 3/0647](#), [G06F 3/0649](#), [G06F 3/065](#), [G06F 3/0652](#), [G06F 3/0653](#), [G06F 3/0655](#), [G06F 3/0656](#), [G06F 3/0658](#), [G06F 3/0659](#), [G06F 3/0661](#), [G06F 3/0662](#), [G06F 3/0664](#), [G06F 3/0665](#), [G06F 3/0667](#), [G06F 3/0668](#), [G06F 3/067](#), [G06F 3/0671](#), [G06F 3/0673](#), [G06F 3/0674](#), [G06F 3/0676](#), [G06F 3/0677](#), [G06F 3/0679](#), [G06F 3/068](#), [G06F 3/0682](#), [G06F 3/0683](#), [G06F 3/0685](#), [G06F 3/0686](#), [G06F 3/0688](#), [G06F 3/0689](#) and [G06F 3/08](#) are incomplete pending reclassification of documents from group [G06F 2003/0697](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 3/0601 . . . {Interfaces specially adapted for storage systems}

**NOTE**

{In this subgroup the following classification rules must be observed:

For a complete classification in the field of [G06F 3/0601](#) documents should receive classification symbols for "invention information" as follows:

- at least one symbol in [G06F 3/0602](#) - [G06F 3/0626](#) for the technical effect achieved and
- at least one symbol in [G06F 3/0628](#) - [G06F 3/0667](#) for the technique used and
- at least one symbol in [G06F 3/0668](#) - [G06F 3/0689](#) for the infrastructure involved.

The classification of "additional information" is optional. CPC symbols in the range [G06F 2206/1004](#) - [G06F 2206/101](#) should be used for classifying "additional information". }

- 3/0602 . . . . {specifically adapted to achieve a particular effect}
- 3/0604 . . . . . {Improving or facilitating administration, e.g. storage management}
- 3/0605 . . . . . {by facilitating the interaction with a user or administrator}
- 3/0607 . . . . . {by facilitating the process of upgrading existing storage systems, e.g. for improving compatibility between host and storage device}

3/0608	. . . . {Saving storage space on storage systems}	3/067	. . . . {Distributed or networked storage systems, e.g. storage area networks [SAN], network attached storage [NAS]}
3/061	. . . . {Improving I/O performance}	3/0671	. . . . {In-line storage system}
3/0611	. . . . {in relation to response time}	3/0673	. . . . {Single storage device}
3/0613	. . . . {in relation to throughput}	3/0674	. . . . {Disk device}
3/0614	. . . . {Improving the reliability of storage systems}	3/0676	. . . . {Magnetic disk device}
3/0616	. . . . {in relation to life time, e.g. increasing Mean Time Between Failures [MTBF]}	3/0677	. . . . {Optical disk device, e.g. CD-ROM, DVD}
3/0617	. . . . {in relation to availability}	3/0679	. . . . {Non-volatile semiconductor memory device, e.g. flash memory, one time programmable memory [OTP]}
3/0619	. . . . {in relation to data integrity, e.g. data losses, bit errors}	3/068	. . . . {Hybrid storage device}
3/062	. . . . {Securing storage systems}	3/0682	. . . . {Tape device}
3/0622	. . . . {in relation to access}	3/0683	. . . . {Plurality of storage devices}
3/0623	. . . . {in relation to content}	3/0685	. . . . {Hybrid storage combining heterogeneous device types, e.g. hierarchical storage, hybrid arrays}
3/0625	. . . . {Power saving in storage systems}	3/0686	. . . . {Libraries, e.g. tape libraries, jukebox}
3/0626	. . . . {Reducing size or complexity of storage systems}	3/0688	. . . . {Non-volatile semiconductor memory arrays}
3/0628	. . . {making use of a particular technique}	3/0689	. . . . {Disk arrays, e.g. RAID, JBOD}
3/0629	. . . . {Configuration or reconfiguration of storage systems}	2003/0697	. . {device management, e.g. handlers, drivers, I/O schedulers}
3/0631	. . . . {by allocating resources to storage systems}	(Frozen)	
3/0632	. . . . {by initialisation or re-initialisation of storage systems}		
3/0634	. . . . {by changing the state or mode of one or more devices}		
3/0635	. . . . {by changing the path, e.g. traffic rerouting, path reconfiguration}		
3/0637	. . . . {Permissions}		
3/0638	. . . . {Organizing or formatting or addressing of data}		
3/064	. . . . {Management of blocks}		
3/0641	. . . . {De-duplication techniques}		
3/0643	. . . . {Management of files}		
3/0644	. . . . {Management of space entities, e.g. partitions, extents, pools}		
3/0646	. . . . {Horizontal data movement in storage systems, i.e. moving data in between storage devices or systems}		
3/0647	. . . . {Migration mechanisms}		
3/0649	. . . . {Lifecycle management}		
3/065	. . . . {Replication mechanisms}		
3/0652	. . . . {Erasing, e.g. deleting, data cleaning, moving of data to a wastebasket}		
3/0653	. . . . {Monitoring storage devices or systems}		
3/0655	. . . . {Vertical data movement, i.e. input-output transfer; data movement between one or more hosts and one or more storage devices}		
3/0656	. . . . {Data buffering arrangements}		
3/0658	. . . . {Controller construction arrangements}		
3/0659	. . . . {Command handling arrangements, e.g. command buffers, queues, command scheduling}		
3/0661	. . . . {Format or protocol conversion arrangements}		
3/0662	. . . . {Virtualisation aspects}		
3/0664	. . . . {at device level, e.g. emulation of a storage device or system}		
3/0665	. . . . {at area level, e.g. provisioning of virtual or logical volumes}		
3/0667	. . . . {at data level, e.g. file, record or object virtualisation}		
3/0668	. . . {adopting a particular infrastructure}		
		3/08	. . from or to individual record carriers, e.g. punched card {, memory card, integrated circuit [IC] card or smart card}
		3/09	. Digital output to typewriters
		3/12	. Digital output to print unit {, e.g. line printer, chain printer}
		3/1201	. . {Dedicated interfaces to print systems}
		3/1202	. . . {specifically adapted to achieve a particular effect}

**WARNING**

Group [G06F 2003/0697](#) is no longer used for the classification of documents as of May 1, 2021.

The content of this group is being reclassified into groups [G06F 3/06](#), [G06F 3/0601](#), [G06F 3/0602](#), [G06F 3/0604](#), [G06F 3/0605](#), [G06F 3/0607](#), [G06F 3/0608](#), [G06F 3/061](#), [G06F 3/0611](#), [G06F 3/0613](#), [G06F 3/0614](#), [G06F 3/0616](#), [G06F 3/0617](#), [G06F 3/0619](#), [G06F 3/062](#), [G06F 3/0622](#), [G06F 3/0623](#), [G06F 3/0625](#), [G06F 3/0626](#), [G06F 3/0628](#), [G06F 3/0629](#), [G06F 3/0631](#), [G06F 3/0632](#), [G06F 3/0634](#), [G06F 3/0635](#), [G06F 3/0637](#), [G06F 3/0638](#), [G06F 3/064](#), [G06F 3/0641](#), [G06F 3/0643](#), [G06F 3/0644](#), [G06F 3/0646](#), [G06F 3/0647](#), [G06F 3/0649](#), [G06F 3/065](#), [G06F 3/0652](#), [G06F 3/0653](#), [G06F 3/0655](#), [G06F 3/0656](#), [G06F 3/0658](#), [G06F 3/0659](#), [G06F 3/0661](#), [G06F 3/0662](#), [G06F 3/0664](#), [G06F 3/0665](#), [G06F 3/0667](#), [G06F 3/0668](#), [G06F 3/067](#), [G06F 3/0671](#), [G06F 3/0673](#), [G06F 3/0674](#), [G06F 3/0676](#), [G06F 3/0677](#), [G06F 3/0679](#), [G06F 3/068](#), [G06F 3/0682](#), [G06F 3/0683](#), [G06F 3/0685](#), [G06F 3/0686](#), [G06F 3/0688](#), [G06F 3/0689](#) and [G06F 3/08](#).

All groups listed in this Warning should be considered in order to perform a complete search.



3/1203	. . . . .	{Improving or facilitating administration, e.g. print management}	3/1235	. . . . .	{caused by end of consumables, e.g. paper, ink, toner}
3/1204	. . . . .	{resulting in reduced user or operator actions, e.g. presetting, automatic actions, using hardware token storing data}	3/1236	. . . . .	{Connection management}
3/1205	. . . . .	{resulting in increased flexibility in print job configuration, e.g. job settings, print requirements, job tickets}	3/1237	. . . . .	{Print job management}
3/1206	. . . . .	{resulting in increased flexibility in input data format or job format or job type}	3/1238	. . . . .	{Secure printing, e.g. user identification, user rights for device usage, unallowed content, blanking portions or fields of a page, releasing held jobs}
3/1207	. . . . .	{resulting in the user being informed about print result after a job submission}	3/1239	. . . . .	{Restricting the usage of resources, e.g. usage or user levels, credit limit, consumables, special fonts}
3/1208	. . . . .	{resulting in improved quality of the output result, e.g. print layout, colours, workflows, print preview}	3/124	. . . . .	{Parallel printing or parallel ripping}
3/1209	. . . . .	{resulting in adapted or bridged legacy communication protocols, e.g. emulation, protocol extension}	3/1241	. . . . .	{Dividing a job according to job requirements, e.g. black/white and colour pages, covers and body of books, tabs}
3/121	. . . . .	{Facilitating exception or error detection and recovery, e.g. fault, media or consumables depleted}	3/1242	. . . . .	{Image or content composition onto a page}
3/1211	. . . . .	{Improving printing performance}	3/1243	. . . . .	{Variable data printing, e.g. document forms, templates, labels, coupons, advertisements, logos, watermarks, transactional printing, fixed content versioning}
3/1212	. . . . .	{achieving reduced delay between job submission and print start}	3/1244	. . . . .	{Job translation or job parsing, e.g. page banding}
3/1213	. . . . .	{at an intermediate node or at the final node}	3/1245	. . . . .	{by conversion to intermediate or common format}
3/1214	. . . . .	{at the submitting node}	3/1246	. . . . .	{by handling markup languages, e.g. XSL, XML, HTML}
3/1215	. . . . .	{achieving increased printing speed, i.e. reducing the time between printing start and printing end}	3/1247	. . . . .	{by conversion to printer ready format}
3/1217	. . . . .	{achieving reduced idle time at the output device or increased asset utilization}	3/1248	. . . . .	{by printer language recognition, e.g. PDL, PCL, PDF}
3/1218	. . . . .	{Reducing or saving of used resources, e.g. avoiding waste of consumables or improving usage of hardware resources}	3/125	. . . . .	{Page layout or assigning input pages onto output media, e.g. imposition}
3/1219	. . . . .	{with regard to consumables, e.g. ink, toner, paper}	3/1251	. . . . .	{for continuous media, e.g. web media, rolls}
3/122	. . . . .	{with regard to computing resources, e.g. memory, CPU}	3/1252	. . . . .	{for sheet based media}
3/1221	. . . . .	{with regard to power consumption}	3/1253	. . . . .	{Configuration of print job parameters, e.g. using UI at the client}
3/1222	. . . . .	{Increasing security of the print job}	3/1254	. . . . .	{Automatic configuration, e.g. by driver}
3/1223	. . . . .	{specifically adapted to use a particular technique}	3/1255	. . . . .	{Settings incompatibility, e.g. constraints, user requirements vs. device capabilities}
3/1224	. . . . .	{Client or server resources management}	3/1256	. . . . .	{User feedback, e.g. print preview, test print, proofing, pre-flight checks}
3/1225	. . . . .	{Software update, e.g. print driver, modules, plug-ins, fonts}	3/1257	. . . . .	{by using pre-stored settings, e.g. job templates, presets, print styles}
3/1226	. . . . .	{Discovery of devices having required properties}	3/1258	. . . . .	{by updating job settings at the printer}
3/1227	. . . . .	{Printer definition files}	3/1259	. . . . .	{Print job monitoring, e.g. job status}
3/1228	. . . . .	{Printing driverless or using generic drivers}	3/126	. . . . .	{Job scheduling, e.g. queuing, determine appropriate device}
3/1229	. . . . .	{Printer resources management or printer maintenance, e.g. device status, power levels}	3/1261	. . . . .	{by using alternate printing}
3/123	. . . . .	{Software or firmware update, e.g. device firmware management}	3/1262	. . . . .	{by grouping or ganging jobs}
3/1231	. . . . .	{Device related settings, e.g. IP address, Name, Identification}	3/1263	. . . . .	{based on job priority, e.g. re-arranging the order of jobs, e.g. the printing sequence}
3/1232	. . . . .	{Transmitting printer device capabilities, e.g. upon request or periodically}	3/1264	. . . . .	{by assigning post-processing resources}
3/1234	. . . . .	{Errors handling and recovery, e.g. reprinting ( <a href="#">G06F 3/1261</a> takes precedence)}	3/1265	. . . . .	{Printing by reference, e.g. retrieving document/image data for a job from a source mentioned in the job}
			3/1267	. . . . .	{Job repository, e.g. non-scheduled jobs, delay printing}

- 3/1268 . . . . . {Job submission, e.g. submitting print job order or request not the print data itself}
- 3/1269 . . . . . {by broadcasting server}
- 3/127 . . . . . {by using hot folders, e.g. folder for which print settings or print data management rules are set in advance}
- 3/1271 . . . . . {Job submission at the printing node, e.g. creating a job from a data stored locally or remotely ([G06F 3/1238 takes precedence](#))}
- 3/1272 . . . . . {Digital storefront, e.g. e-ordering, web2print, submitting a job from a remote submission screen}
- 3/1273 . . . . . {Print job history, e.g. logging, accounting, tracking}
- 3/1274 . . . . . {Deleting of print job}
- 3/1275 . . . . . {Print workflow management, e.g. defining or changing a workflow, cross publishing}
- 3/1276 . . . . . {within a printer driver, e.g. driver resides either on a server or on a client}
- 3/1277 . . . . . {using filter pipeline, e.g. outside the driver, adding traps}
- 3/1278 . . . . . {specifically adapted to adopt a particular infrastructure}
- 3/1279 . . . . . {Controller construction, e.g. aspects of the interface hardware}
- 3/128 . . . . . {Direct printing, e.g. sending document file, using memory stick, printing from a camera}
- 3/1281 . . . . . {Multi engine printer devices, e.g. one entity having multiple output engines}
- 3/1282 . . . . . {High volume printer device}
- 3/1284 . . . . . {Local printer device}
- 3/1285 . . . . . {Remote printer device, e.g. being remote from client or server}
- 3/1286 . . . . . {via local network}
- 3/1287 . . . . . {via internet}
- 3/1288 . . . . . {in client-server-printer device configuration}
- 3/1289 . . . . . {in server-client-printer device configuration, e.g. the server does not see the printer}
- 3/129 . . . . . {in server-printer device-client configuration, e.g. print flow goes from server to printer and then bidirectional from printer to client, i.e. the client does not communicate with the server}
- 3/1291 . . . . . {Pool of printer devices: self-managing printing devices in a network, e.g. without a server}
- 3/1292 . . . . . {Mobile client, e.g. wireless printing}
- 3/1293 . . . . . {Printer information exchange with computer}
- 3/1294 . . . . . {Status or feedback related to information exchange}
- 3/1295 . . . . . {Buffering means}
- 3/1296 . . . . . {Printer job scheduling or printer resource handling}
- 3/1297 . . . . . {Printer code translation, conversion, emulation, compression; Configuration of printer parameters}
- 3/1298 . . . . . {Printer language recognition, e.g. programme control language, page description language}
- 3/13 . . . . . Digital output to plotter {; Cooperation and interconnection of the plotter with other functional units}
- 3/14 . . . . . Digital output to display device {; Cooperation and interconnection of the display device with other functional units}
- 3/1407 . . . . . {General aspects irrespective of display type, e.g. determination of decimal point position, display with fixed or driving decimal point, suppression of non-significant zeros}
- 3/1415 . . . . . {with means for detecting differences between the image stored in the host and the images displayed on the displays}
- 3/1423 . . . . . {controlling a plurality of local displays, e.g. CRT and flat panel display}
- 3/1431 . . . . . {using a single graphics controller}
- 3/1438 . . . . . {using more than one graphics controller}
- 3/1446 . . . . . {display composed of modules, e.g. video walls}
- 3/1454 . . . . . {involving copying of the display data of a local workstation or window to a remote workstation or window so that an actual copy of the data is displayed simultaneously on two or more displays, e.g. teledisplay}
- 3/1462 . . . . . {with means for detecting differences between the image stored in the host and the images displayed on the remote displays}
- 3/147 . . . . . using display panels
- 3/1475 . . . . . {with conversion of CRT control signals to flat panel control signals, e.g. adapting the palette memory}
- 3/153 . . . . . using cathode-ray tubes
- 3/16 . . . . . Sound input; Sound output ([speech processing G10L](#))
- 3/162 . . . . . {Interface to dedicated audio devices, e.g. audio drivers, interface to CODECs}
- 3/165 . . . . . {Management of the audio stream, e.g. setting of volume, audio stream path}
- 3/167 . . . . . {Audio in a user interface, e.g. using voice commands for navigating, audio feedback}
- 5/00 Methods or arrangements for data conversion without changing the order or content of the data handled**
- 5/01 . . . . . for shifting, e.g. justifying, scaling, normalising {[\(digital stores in which the information is moved stepwise, e.g. shift-registers G11C 19/00; digital stores in which the information circulates G11C 21/00\)](#)}
- 5/012 . . . . . {in floating-point computations}
- 5/015 . . . . . {having at least two separately controlled shifting levels, e.g. using shifting matrices ([G06F 5/012 takes precedence](#))}
- 5/017 . . . . . {using recirculating storage elements}
- 5/06 . . . . . for changing the speed of data flow, i.e. speed regularising {or timing, e.g. delay lines, FIFO buffers; over- or underrun control therefor ([G06F 7/78 takes precedence](#))}
- 5/065 . . . . . {Partitioned buffers, e.g. allowing multiple independent queues, bidirectional FIFO's}
- 5/08 . . . . . having a sequence of storage locations, the intermediate ones not being accessible for either enqueue or dequeue operations, e.g. using a shift register {([G06F 5/065 takes precedence; shift registers per se G11C 19/00](#))}
- 5/085 . . . . . {in which the data is recirculated}

- 5/10 . . having a sequence of storage locations each being individually accessible for both enqueue and dequeue operations, e.g. using random access memory {[\(G06F 5/065 takes precedence\)](#)}
- 5/12 . . . Means for monitoring the fill level; Means for resolving contention, i.e. conflicts between simultaneous enqueue and dequeue operations
- 5/14 . . . . for overflow or underflow handling, e.g. full or empty flags
- 5/16 . . Multiplexed systems, i.e. using two or more similar devices which are alternately accessed for enqueue and dequeue operations, e.g. ping-pong buffers
- 7/00 Methods or arrangements for processing data by operating upon the order or content of the data handled (logic circuits [H03K 19/00](#))**
- 7/02 . Comparing digital values ([G06F 7/06](#), {[G06F 7/22](#), [G06F 7/38 take precedence](#)})
- 7/023 . . {adaptive, e.g. self learning}
- 7/026 . . {Magnitude comparison, i.e. determining the relative order of operands based on their numerical value, e.g. window comparator}
- 7/06 . Arrangements for sorting, selecting, merging, or comparing data on individual record carriers
- 7/08 . . Sorting, i.e. grouping record carriers in numerical or other ordered sequence according to the classification of at least some of the information they carry ([by merging two or more sets of carriers in ordered sequence \[G06F 7/16\]\(#\)](#))
- 7/10 . . Selecting, i.e. obtaining data of one kind from those record carriers which are identifiable by data of a second kind from a mass of ordered or randomly- distributed record carriers
- 7/12 . . . with provision for printing-out a list of selected items
- 7/14 . . Merging, i.e. combining at least two sets of record carriers each arranged in the same ordered sequence to produce a single set having the same ordered sequence
- 7/16 . . . Combined merging and sorting
- 7/20 . . Comparing separate sets of record carriers arranged in the same sequence to determine whether at least some of the data in one set is identical with that in the other set or sets
- 7/22 . Arrangements for sorting or merging computer data on continuous record carriers, e.g. tape, drum, disc
- 7/24 . . Sorting, i.e. extracting data from one or more carriers, rearranging the data in numerical or other ordered sequence, and rerecording the sorted data on the original carrier or on a different carrier or set of carriers {[sorting methods in general](#)} ([G06F 7/36 takes precedence](#))
- 7/26 . . . the sorted data being recorded on the original record carrier within the same space in which the data had been recorded prior to their sorting, without using intermediate storage
- 7/32 . . Merging, i.e. combining data contained in ordered sequence on at least two record carriers to produce a single carrier or set of carriers having all the original data in the ordered sequence {[merging methods in general](#)} ([G06F 7/36 takes precedence](#))
- 7/36 . . Combined merging and sorting
- 7/38 . Methods or arrangements for performing computations using exclusively denominational number representation, e.g. using binary, ternary, decimal representation
- 7/381 . . {using cryogenic components, e.g. Josephson gates}
- 7/383 . . {using magnetic or similar elements ([parametric and other resonant circuits \[G06F 7/388\]\(#\)](#))}
- 7/385 . . . {magnetic bubbles}
- 7/386 . . . {decimal, radix 20 or 12 ([G06F 7/385 takes precedence](#))}
- 7/388 . . {using other various devices such as electrochemical, microwave, surface acoustic wave, neuristor, electron beam switching, resonant, e.g. parametric, ferro-resonant}
- 7/40 . . using contact-making devices, e.g. electromagnetic relay ([G06F 7/46 takes precedence](#))
- 7/405 . . . {binary}
- 7/42 . . . Adding; Subtracting {([G06F 7/405 takes precedence](#))}
- 7/44 . . . Multiplying; Dividing {([G06F 7/405 takes precedence](#))}
- 7/443 . . . . {by successive additions or subtractions}
- 7/446 . . . . {by partial product forming (with electric multiplication table)}
- 7/46 . . using electromechanical counter-type accumulators
- 7/461 . . . {Adding; subtracting}
- 7/462 . . . {Multiplying; dividing}
- 7/463 . . . . {by successive additions or subtractions}
- 7/465 . . . . {by partial product forming (with electric multiplication table)}
- 7/466 . . . . {by successive multiplication or division by 2}
- 7/467 . . . . {by using preset multiples of the multiplicand or the divisor}
- 7/468 . . . {for evaluating functions by calculation}
- 7/48 . . using non-contact-making devices, e.g. tube, solid state device; using unspecified devices
- 7/4806 . . . {Computations with complex numbers}
- 7/4812 . . . . {Complex multiplication}
- 7/4818 . . . . {using coordinate rotation digital computer [CORDIC]}
- 7/4824 . . . {using signed-digit representation}
- 7/483 . . . Computations with numbers represented by a non-linear combination of denominational numbers, e.g. rational numbers, logarithmic number system or floating-point numbers {([G06F 7/4806](#), [G06F 7/4824](#), [G06F 7/49](#), [G06F 7/491](#), [G06F 7/544 take precedence](#))}
- 7/4833 . . . . {Logarithmic number system}
- 7/4836 . . . . {Computations with rational numbers}
- 7/485 . . . . Adding; Subtracting {([G06F 7/4833](#), [G06F 7/4836 take precedence](#))}
- 7/487 . . . . Multiplying; Dividing {([G06F 7/4833](#), [G06F 7/4836 take precedence](#))}
- 7/4873 . . . . . {Dividing}
- 7/4876 . . . . . {Multiplying}
- 7/49 . . . Computations with a radix, other than binary, 8, 16 or decimal, e.g. ternary, negative or imaginary radices, mixed radix {[non-linear PCM \[G06F 7/4824 takes precedence\]\(#\)](#)}

- 7/491 . . . Computations with decimal numbers {radix 12 or 20. ([G06F 7/4824](#) takes precedence)}
- 7/4912 . . . . {Adding; Subtracting ([G06F 7/492](#), [G06F 7/498](#) take precedence)}
- 7/4915 . . . . {Multiplying; Dividing ([G06F 7/492](#), [G06F 7/498](#) take precedence)}
- 7/4917 . . . . {Dividing}
- 7/492 . . . . using a binary weighted representation within each denomination {([G06F 7/498](#) takes precedence)}
- 7/4925 . . . . . {Adding; Subtracting ([G06F 7/493](#) takes precedence)}
- 7/493 . . . . . the representation being the natural binary coded representation, i.e. 8421-code
- 7/494 . . . . . Adding; Subtracting
- 7/495 . . . . . in digit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other
- 7/496 . . . . . Multiplying; Dividing
- 7/498 . . . . using counter-type accumulators
- 7/4981 . . . . . {Adding; Subtracting}
- 7/4983 . . . . . {Multiplying; Dividing}
- 7/4985 . . . . . {by successive additions or subtractions}
- 7/4986 . . . . . {by successive multiplication or division by 2}
- 7/4988 . . . . . {by table look-up}
- 7/499 . . . Denomination or exception handling, e.g. rounding or overflow
- 7/49905 . . . . {Exception handling}
- 7/4991 . . . . . {Overflow or underflow}
- 7/49915 . . . . . {Mantissa overflow or underflow in handling floating-point numbers}
- 7/49921 . . . . . {Saturation, i.e. clipping the result to a minimum or maximum value}
- 7/49926 . . . . . {Division by zero}
- 7/49931 . . . . {Modulo N reduction of final result}
- 7/49936 . . . . {Normalisation mentioned as feature only}
- 7/49942 . . . . {Significance control}
- 7/49947 . . . . . {Rounding}
- 7/49952 . . . . . {Sticky bit}
- 7/49957 . . . . . {Implementation of IEEE-754 Standard}
- 7/49963 . . . . . {Rounding to nearest ([G06F 7/49957](#) takes precedence)}
- 7/49968 . . . . . {Rounding towards positive infinity ([G06F 7/49957](#) takes precedence)}
- 7/49973 . . . . . {Rounding towards negative infinity, e.g. truncation of two's complement numbers ([G06F 7/49957](#) takes precedence)}
- 7/49978 . . . . . {Rounding towards zero ([G06F 7/49957](#) takes precedence)}
- 7/49984 . . . . . {Rounding away from zero}
- 7/49989 . . . . . {Interval arithmetic}
- 7/49994 . . . . {Sign extension}
- 7/50 . . . Adding; Subtracting ([G06F 7/483](#) - [G06F 7/491](#), [G06F 7/544](#) - [G06F 7/556](#) take precedence)
- 7/501 . . . . Half or full adders, i.e. basic adder cells for one denomination
- 7/5013 . . . . . {using algebraic addition of the input signals, e.g. Kirchhoff adders}
- 7/5016 . . . . . {forming at least one of the output signals directly from the minterms of the input signals, i.e. with a minimum number of gate levels}
- 7/502 . . . . . Half adders; Full adders consisting of two cascaded half adders {([G06F 7/5013](#) takes precedence)}
- 7/503 . . . . . using carry switching, i.e. the incoming carry being connected directly, or only via an inverter, to the carry output under control of a carry propagate signal
- 7/504 . . . . . in bit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other
- 7/5045 . . . . . {for multiple operands}
- 7/505 . . . . . in bit-parallel fashion, i.e. having a different digit-handling circuit for each denomination
- 7/5052 . . . . . {using carry completion detection, either over all stages or at sample stages only}
- 7/5055 . . . . . {in which one operand is a constant, i.e. incrementers or decrementers}
- 7/5057 . . . . . {using table look-up}; using programmable logic arrays ([G06F 7/509](#) takes precedence)
- 7/506 . . . . . with simultaneous carry generation for, or propagation over, two or more stages
- 7/507 . . . . . using selection between two conditionally calculated carry or sum values
- 7/508 . . . . . using carry look-ahead circuits
- 7/509 . . . . . for multiple operands, e.g. digital integrators
- 7/5095 . . . . . {word-serial, i.e. with an accumulator-register}
- 7/52 . . . Multiplying; Dividing ([G06F 7/483](#) - [G06F 7/491](#), [G06F 7/544](#) take precedence)
- 7/523 . . . . Multiplying only
- 7/5235 . . . . . {using indirect methods, e.g. quarter square method, via logarithmic domain}
- 7/525 . . . . . in serial-serial fashion, i.e. both operands being entered serially ([G06F 7/533](#) takes precedence)
- 7/527 . . . . . in serial-parallel fashion, i.e. one operand being entered serially and the other in parallel ([G06F 7/533](#) takes precedence)
- 7/5272 . . . . . {with row wise addition of partial products}
- 7/5275 . . . . . . {using carry save adders}
- 7/5277 . . . . . . {with column wise addition of partial products}
- 7/53 . . . . . in parallel-parallel fashion, i.e. both operands being entered in parallel ([G06F 7/533](#) takes precedence)
- 7/5306 . . . . . {with row wise addition of partial products ([G06F 7/5324](#) takes precedence)}
- 7/5312 . . . . . . {using carry save adders}
- 7/5318 . . . . . . {with column wise addition of partial products, e.g. using Wallace tree, Dadda counters ([G06F 7/5324](#) takes precedence)}



- 7/5324 . . . . . {partitioned, i.e. using repetitively a smaller parallel parallel multiplier or using an array of such smaller multipliers}
- 7/533 . . . . . Reduction of the number of iteration steps or stages, e.g. using the Booth algorithm, log-sum, odd-even
- 7/5332 . . . . . {by skipping over strings of zeroes or ones, e.g. using the Booth Algorithm}
- 7/5334 . . . . . {by using multiple bit scanning, i.e. by decoding groups of successive multiplier bits in order to select an appropriate precalculated multiple of the multiplicand as a partial product}
- 7/5336 . . . . . {overlapped, i.e. with successive bitgroups sharing one or more bits being recoded into signed digit representation, e.g. using the Modified Booth Algorithm}
- 7/5338 . . . . . {each bitgroup having two new bits, e.g. 2nd order MBA}
- 7/535 . . . . . Dividing only
- 7/537 . . . . . Reduction of the number of iteration steps or stages, e.g. using the Sweeny-Robertson-Tocher [SRT] algorithm
- 7/5375 . . . . . {Non restoring calculation, where each digit is either negative, zero or positive, e.g. SRT;}
- 7/544 . . . . . for evaluating functions by calculation {[\(G06F 7/4824 takes precedence\)](#)}
- 7/5443 . . . . . {Sum of products (for applications thereof, see the relevant places, e.g. [G06F 17/10](#), [H03H 17/00](#))}
- 7/5446 . . . . . {using crossaddition algorithms, e.g. CORDIC}
- 7/548 . . . . . Trigonometric functions; Co-ordinate transformations
- 7/552 . . . . . Powers or roots {, e.g. Pythagorean sums}
- 7/5525 . . . . . {Roots or inverse roots of single operands}
- 7/556 . . . . . Logarithmic or exponential functions
- 7/57 . . . . . Arithmetic logic units [ALU], i.e. arrangements or devices for performing two or more of the operations covered by groups [G06F 7/483](#) – [G06F 7/556](#) or for performing logical operations {([G06F 7/49](#), [G06F 7/491](#) take precedence)}
- 7/575 . . . . . Basic arithmetic logic units, i.e. devices selectable to perform either addition, subtraction or one of several logical operations, using, at least partially, the same circuitry
- 7/58 . . . . . Random or pseudo-random number generators
- 7/582 . . . . . {Pseudo-random number generators}
- 7/584 . . . . . {using finite field arithmetic, e.g. using a linear feedback shift register}
- 7/586 . . . . . {using an integer algorithm, e.g. using linear congruential method}
- 7/588 . . . . . {Random number generators, i.e. based on natural stochastic processes}
- 7/60 . . . . . Methods or arrangements for performing computations using a digital non-denominational number representation, i.e. number representation without radix; Computing devices using combinations of denominational and non-denominational quantity representations {, e.g. using difunction pulse trains, STEELE computers, phase computers (conversion of digital data to or from non-denominational form [H03M 5/00](#), [H03M 7/00](#))}
- 7/602 . . . . . {using delta-sigma sequences}
- 7/605 . . . . . {Additive or subtractive mixing of two pulse rates into one (beat-frequency oscillators [H03B 21/00](#); input circuits of electric counters, e.g. up-down counters [H03K 21/00](#))}
- 7/607 . . . . . {number-of-ones counters, i.e. devices for counting the number of input lines set to ONE among a plurality of input lines, also called bit counters or parallel counters (for applications thereof, see the relevant places, e.g. [G06F 7/49](#), [G06F 7/5013](#), [G06F 7/509](#), [H03M 1/00](#), [H03M 7/20](#))}
- 7/62 . . . . . Performing operations exclusively by counting total number of pulses {; Multiplication, division or derived operations using combined denominational and incremental processing by counters, i.e. without column shift ([G06F 7/68](#) takes precedence)}
- 7/64 . . . . . Digital differential analysers, i.e. computing devices for differentiation, integration or solving differential or integral equations, using pulses representing increments; Other incremental computing devices for solving difference equations ([G06F 7/70](#) takes precedence; differential analysers using hybrid computing techniques [G06J 1/02](#) {; DDA application in numerical control [G05B 19/18](#))}
- 7/66 . . . . . wherein pulses represent unitary increments only
- 7/68 . . . . . using pulse rate multipliers or dividers {pulse rate multipliers or dividers per se} ([G06F 7/70](#) takes precedence {; frequency division in electronic watches [G04G 3/02](#); frequency multiplication or division in oscillators [H03B 19/00](#); frequency dividing counters per se [H03K 23/00](#) - [H03K 29/00](#))}
- 7/70 . . . . . using stochastic pulse trains, i.e. randomly occurring pulses the average pulse rates of which represent numbers {(conversion of analogue signals into stochastic pulse trains and vice versa [H03M 1/04](#))}
- 7/72 . . . . . using residue arithmetic
- 7/721 . . . . . {Modular inversion, reciprocal or quotient calculation ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/722 . . . . . {Modular multiplication ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/723 . . . . . {Modular exponentiation ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/724 . . . . . {Finite field arithmetic (for error detection or correction in general [H03M 13/00](#), in computers [G06F 11/10](#))}
- 7/725 . . . . . {over elliptic curves}
- 7/726 . . . . . {Inversion; Reciprocal calculation; Division of elements of a finite field}

7/727	. . . {Modulo N arithmetic, with N being either $(2**n)-1$ , $2**n$ or $(2**n)+1$ , e.g. mod 3, mod 4 or mod 5 ( <a href="#">G06F 7/728</a> takes precedence)}	8/433	. . . . {Dependency analysis; Data or control flow analysis}
7/728	. . . {using Montgomery reduction}	8/434	. . . . {Pointers; Aliasing}
7/729	. . . {using representation by a residue number system}	8/436	. . . . {Semantic checking}
7/74	. Selecting or encoding within a word the position of one or more bits having a specified value, e.g. most or least significant one or zero detection, priority encoders ({with shifting <a href="#">G06F 5/01</a> })	8/437	. . . . {Type checking}
7/76	. Arrangements for rearranging, permuting or selecting data according to predetermined rules, independently of the content of the data	8/44	. . . {Encoding}
7/762	. . {having at least two separately controlled rearrangement levels, e.g. multistage interconnection networks ( <a href="#">G06F 7/764</a> - <a href="#">G06F 7/768</a> take precedence)}	8/441	. . . . {Register allocation; Assignment of physical memory space to logical memory space}
7/764	. . {Masking}	8/443	. . . . {Optimisation}
7/766	. . {Generation of all possible permutations}	8/4432	. . . . {Reducing the energy consumption}
7/768	. . {Data position reversal, e.g. bit reversal, byte swapping}	8/4434	. . . . {Reducing the memory space required by the program code}
7/78	. . for changing the order of data flow, e.g. matrix transposition or LIFO buffers; Overflow or underflow handling therefor	8/4435	. . . . {Detection or removal of dead or redundant code}
7/785	. . . {having a sequence of storage locations each being individually accessible for both enqueue and dequeue operations, e.g. using a RAM}	8/4436	. . . . {Exlining; Procedural abstraction}
8/00	<b>Arrangements for software engineering (testing or debugging <a href="#">G06F 11/36</a>; administrative, planning or organisation aspects of software project management <a href="#">G06Q 10/06</a>)</b>	8/4441	. . . . {Reducing the execution time required by the program code}
8/10	. Requirements analysis; Specification techniques	8/4442	. . . . {Reducing the number of cache misses; Data prefetching (cache prefetching <a href="#">G06F 12/0862</a> )}
8/20	. Software design	8/4443	. . . . {Inlining}
8/22	. . {Procedural}	8/445	. . . . {Exploiting fine grain parallelism, i.e. parallelism at instruction level (run-time instruction scheduling <a href="#">G06F 9/3836</a> )}
8/24	. . {Object-oriented}	8/4451	. . . . {Avoiding pipeline stalls}
8/30	. Creation or generation of source code	8/4452	. . . . {Software pipelining}
8/31	. . {Programming languages or programming paradigms}	8/447	. . . . {Target code generation}
8/311	. . . {Functional or applicative languages; Rewrite languages}	8/45	. . . {Exploiting coarse grain parallelism in compilation, i.e. parallelism between groups of instructions}
8/312	. . . {List processing, e.g. LISP programming language}	8/451	. . . . {Code distribution (considering CPU load at run-time <a href="#">G06F 9/505</a> ; load rebalancing <a href="#">G06F 9/5083</a> )}
8/313	. . . {Logic programming, e.g. PROLOG programming language}	8/452	. . . . {Loops}
8/3135	. . . . {Unification or backtracking}	8/453	. . . . {Data distribution}
8/314	. . . {Parallel programming languages ( <a href="#">G06F 8/313</a> takes precedence)}	8/454	. . . . {Consistency (cache consistency protocols in hierarchically structured memory systems <a href="#">G06F 12/0815</a> )}
8/315	. . . {Object-oriented languages}	8/456	. . . . {Parallelism detection}
8/316	. . . {Aspect-oriented programming techniques}	8/457	. . . . {Communication (intertask communication <a href="#">G06F 9/54</a> )}
8/33	. . Intelligent editors	8/458	. . . . {Synchronisation, e.g. post-wait, barriers, locks (synchronisation among tasks <a href="#">G06F 9/52</a> )}
8/34	. . Graphical or visual programming	8/47	. . . {Retargetable compilers}
8/35	. . model driven	8/48	. . . {Incremental compilation (software reuse <a href="#">G06F 8/36</a> )}
8/355	. . . {Round-trip engineering}	8/49	. . . {Partial evaluation}
8/36	. . Software reuse	8/51	. . Source to source
8/37	. . {Compiler construction; Parser generation}	8/52	. . Binary to binary
8/38	. . for implementing user interfaces	8/53	. . Decompilation; Disassembly
8/40	. Transformation of program code	8/54	. . Link editing before load time
8/41	. . Compilation	8/60	. Software deployment
8/42	. . . {Syntactic analysis}	8/61	. . Installation
8/423	. . . . {Preprocessors}	8/62	. . . {Uninstallation}
8/425	. . . . {Lexical analysis}	8/63	. . . {Image based installation; Cloning; Build to order}
8/427	. . . . {Parsing}	8/64	. . . {Retargetable}
8/43	. . . {Checking; Contextual analysis}		

8/65	. . . Updates ( <a href="#">security arrangements therefor G06F 21/57</a> )	9/262	. . . . . {Arrangements for next microinstruction selection}
	<b>WARNING</b>	9/264	. . . . . {Microinstruction selection based on results of processing}
	Group <a href="#">G06F 8/65</a> is impacted by reclassification into groups <a href="#">G06F 21/57</a> - <a href="#">G06F 21/577</a> .	9/265	. . . . . {by address selection on input of storage}
	All groups listed in this Warning should be considered in order to perform a complete search.	9/267	. . . . . {by instruction selection on output of storage}
8/654	. . . using techniques specially adapted for alterable solid state memories, e.g. for EEPROM or flash memories	9/268	. . . . . {Microinstruction selection not based on processing results, e.g. interrupt, patch, first cycle store, diagnostic programs}
8/656	. . . while running	9/28	. . . Enhancement of operational speed, e.g. by using several microcontrol devices operating in parallel
8/658	. . . Incremental updates; Differential updates	9/30	. . Arrangements for executing machine instructions, e.g. instruction decode ( <a href="#">for executing microinstructions G06F 9/22</a> )
8/66	. . . {of program code stored in read-only memory [ROM]}	9/30003	. . . {Arrangements for executing specific machine instructions}
8/70	. Software maintenance or management	9/30007	. . . . . {to perform operations on data operands}
8/71	. . Version control ( <a href="#">security arrangements therefor G06F 21/57</a> ); Configuration management	9/3001	. . . . . {Arithmetic instructions}
	<b>WARNING</b>	9/30014	. . . . . {with variable precision}
	Group <a href="#">G06F 8/71</a> is impacted by reclassification into groups <a href="#">G06F 21/57</a> - <a href="#">G06F 21/577</a> .	9/30018	. . . . . {Bit or string instructions; instructions using a mask}
	All groups listed in this Warning should be considered in order to perform a complete search.	9/30021	. . . . . {Compare instructions, e.g. Greater-Than, Equal-To, MINMAX}
8/72	. . Code refactoring	9/30025	. . . . . {Format conversion instructions, e.g. Floating-Point to Integer, decimal conversion}
8/73	. . Program documentation	9/30029	. . . . . {Logical and Boolean instructions, e.g. XOR, NOT}
8/74	. . Reverse engineering; Extracting design information from source code	9/30032	. . . . . {Movement instructions, e.g. MOVE, SHIFT, ROTATE, SHUFFLE}
8/75	. . Structural analysis for program understanding	9/30036	. . . . . {Instructions to perform operations on packed data, e.g. vector operations}
8/751	. . . {Code clone detection}	9/3004	. . . . . {to perform operations on memory}
8/76	. . Adapting program code to run in a different environment; Porting	9/30043	. . . . . {LOAD or STORE instructions; Clear instruction}
8/77	. . Software metrics	9/30047	. . . . . {Prefetch instructions; cache control instructions}
8/78	. . {Methods to solve the "Year 2000" [Y2K] problem}	9/3005	. . . . . {to perform operations for flow control}
<b>9/00</b>	<b>Arrangements for program control, e.g. control units (program control for peripheral devices <a href="#">G06F 13/10</a>)</b>	9/30054	. . . . . {Unconditional branch instructions}
9/02	. using wired connections, e.g. plugboards	9/30058	. . . . . {Conditional branch instructions}
9/04	. using record carriers containing only program instructions ( <a href="#">G06F 9/06 takes precedence</a> )	9/30061	. . . . . {Multi-way branch instructions, e.g. CASE}
9/06	. using stored programs, i.e. using an internal store of processing equipment to receive or retain programs	9/30065	. . . . . {Loop control instructions; iterative instructions, e.g. LOOP, REPEAT}
9/22	. . Microcontrol or microprogram arrangements	9/30069	. . . . . {Instruction skipping instructions, e.g. SKIP}
9/223	. . . {Execution means for microinstructions irrespective of the microinstruction function, e.g. decoding of microinstructions and nanoinstructions; timing of microinstructions; programmable logic arrays; delays and fan-out problems}	9/30072	. . . . . {to perform conditional operations, e.g. using guard}
9/226	. . . {Microinstruction function, e.g. input/output microinstruction; diagnostic microinstruction; microinstruction format}	9/30076	. . . . . {to perform miscellaneous control operations, e.g. NOP}
9/24	. . . Loading of the microprogram	9/30079	. . . . . {Pipeline control instructions}
9/26	. . . Address formation of the next micro-instruction ( <a href="#">G06F 9/28 takes precedence</a> ); Microprogram storage or retrieval arrangements}	9/30083	. . . . . {Power or thermal control instructions}
9/261	. . . . . {Microinstruction address formation}	9/30087	. . . . . {Synchronisation or serialisation instructions}
		9/3009	. . . . . {Thread control instructions}
		9/30094	. . . {Condition code generation, e.g. Carry, Zero flag}
		9/30098	. . . {Register arrangements}
		9/30101	. . . {Special purpose registers}
		9/30105	. . . {Register structure}

9/30109	. . . . .	{having multiple operands in a single register}	9/355	. . . . .	Indexed addressing {, i.e. using more than one address operand}
9/30112	. . . . .	{for variable length data, e.g. single or double registers}	9/3552	. . . . .	{using wraparound, e.g. modulo or circular addressing}
9/30116	. . . . .	{Shadow registers, e.g. coupled registers, not forming part of the register space}	9/3555	. . . . .	{using scaling, e.g. multiplication of index}
9/3012	. . . . .	{Organisation of register space, e.g. banked or distributed register file}	9/3557	. . . . .	{using program counter as base address}
9/30123	. . . . .	{according to context, e.g. thread buffers}	9/38	. . .	Concurrent instruction execution, e.g. pipeline, look ahead
9/30127	. . . . .	{Register windows}	9/3802	. . . . .	{Instruction prefetching}
9/3013	. . . . .	{according to data content, e.g. floating-point registers, address registers}	9/3804	. . . . .	{for branches, e.g. hedging, branch folding}
9/30134	. . . . .	{Register stacks; shift registers}	9/3806	. . . . .	{using address prediction, e.g. return stack, branch history buffer}
9/30138	. . . . .	{Extension of register space, e.g. register cache}	9/3808	. . . . .	{for instruction reuse, e.g. trace cache, branch target cache}
9/30141	. . . . .	{Implementation provisions of register files, e.g. ports}	9/381	. . . . .	{Loop buffering}
9/30145	. . .	{Instruction analysis, e.g. decoding, instruction word fields}	9/3812	. . . . .	{with instruction modification, e.g. store into instruction stream}
9/30149	. . . . .	{of variable length instructions}	9/3814	. . . . .	{Implementation provisions of instruction buffers, e.g. prefetch buffer; banks}
9/30152	. . . . .	{Determining start or end of instruction; determining instruction length}	9/3816	. . . . .	{Instruction alignment, e.g. cache line crossing}
9/30156	. . . . .	{Special purpose encoding of instructions, e.g. Gray coding}	9/3818	. . . . .	{Decoding for concurrent execution}
9/3016	. . . . .	{Decoding the operand specifier, e.g. specifier format}	9/382	. . . . .	{Pipelined decoding, e.g. using predecoding}
9/30163	. . . . .	{with implied specifier, e.g. top of stack}	9/3822	. . . . .	{Parallel decoding, e.g. parallel decode units}
9/30167	. . . . .	{of immediate specifier, e.g. constants}	9/3824	. . . . .	{Operand accessing}
9/3017	. . .	{Runtime instruction translation, e.g. macros}	9/3826	. . . . .	{Data result bypassing, e.g. locally between pipeline stages, within a pipeline stage}
9/30174	. . . . .	{for non-native instruction set, e.g. Javabyte, legacy code}	9/3828	. . . . .	{with global bypass, e.g. between pipelines, between clusters}
9/30178	. . . . .	{of compressed or encrypted instructions}	9/383	. . . . .	{Operand prefetching ( <a href="#">cache prefetching G06F 12/0862</a> )}
9/30181	. . .	{Instruction operation extension or modification}	9/3832	. . . . .	{Value prediction for operands; operand history buffers}
9/30185	. . . . .	{according to one or more bits in the instruction, e.g. prefix, sub-opcode}	9/3834	. . . . .	{Maintaining memory consistency ( <a href="#">cache consistency protocols G06F 12/0815</a> )}
9/30189	. . . . .	{according to execution mode, e.g. mode flag}	9/3836	. . . . .	{Instruction issuing, e.g. dynamic instruction scheduling, out of order instruction execution}
9/30192	. . . . .	{according to data descriptor, e.g. dynamic data typing}	9/3838	. . . . .	{Dependency mechanisms, e.g. register scoreboarding}
9/30196	. . . . .	{using decoder, e.g. decoder per instruction set, adaptable or programmable decoders}	9/384	. . . . .	{Register renaming}
9/32	. . .	Address formation of the next instruction, e.g. by incrementing the instruction counter ( <a href="#">G06F 9/38 takes precedence</a> )	9/3842	. . . . .	{Speculative instruction execution}
9/321	. . . . .	{Program or instruction counter, e.g. incrementing}	9/3844	. . . . .	{using dynamic prediction, e.g. branch history table}
9/322	. . . . .	{for non-sequential address}	9/3846	. . . . .	{using static prediction, e.g. branch taken strategy}
9/324	. . . . .	{using program counter relative addressing}	9/3848	. . . . .	{using hybrid branch prediction, e.g. selection between prediction techniques}
9/325	. . . . .	{for loops, e.g. loop detection, loop counter}	9/3851	. . . . .	{from multiple instruction streams, e.g. multistreaming ( <a href="#">initiation or dispatching of multiple tasks or threads G06F 9/48</a> )}
9/327	. . . . .	{for interrupts}	9/3853	. . . . .	{of compound instructions}
9/328	. . . . .	{for runtime instruction patching}	9/3855	. . . . .	{Reordering, e.g. using a queue, age tags}
9/34	. . .	Addressing or accessing the instruction operand or the result {; Formation of operand address; Addressing modes ( <a href="#">address translation G06F 12/00</a> )}	9/3857	. . . . .	{Result writeback, i.e. updating the architectural state}
9/342	. . . . .	{Extension of operand address space}	9/3859	. . . . .	{with result invalidation, e.g. nullification}
9/345	. . . . .	of multiple operands or results {( <a href="#">addressing multiple banks G06F 12/06</a> )}			
9/3455	. . . . .	{using stride}			
9/35	. . . . .	Indirect addressing {, i.e. using single address operand, e.g. address register}			



9/3861	. . . .	{Recovery, e.g. branch miss-prediction, exception handling (error detection or correction <a href="#">G06F 11/00</a> )}	9/445	. . . .	Program loading or initiating ( <a href="#">bootstrapping G06F 9/4401</a> ; security arrangements for program loading or initiating <a href="#">G06F 21/57</a> )
9/3863	. . . .	{using multiple copies of the architectural state, e.g. shadow registers}	<b>WARNING</b>		
9/3865	. . . .	{using deferred exception handling, e.g. exception flags}	Group <a href="#">G06F 9/445</a> is impacted by reclassification into groups <a href="#">G06F 21/57</a> - <a href="#">G06F 21/577</a> .		
9/3867	. . . .	{using instruction pipelines}	All groups listed in this Warning should be considered in order to perform a complete search.		
9/3869	. . . .	{Implementation aspects, e.g. pipeline latches; pipeline synchronisation and clocking}	9/44505	. . . .	{Configuring for program initiating, e.g. using registry, configuration files}
9/3871	. . . .	{Asynchronous instruction pipeline, e.g. using handshake signals between stages}	9/4451	. . . .	{User profiles; Roaming}
9/3873	. . . .	{Variable length pipelines, e.g. elastic pipeline}	9/44521	. . . .	{Dynamic linking or loading; Link editing at or after load time, e.g. Java class loading}
9/3875	. . . .	{Pipelining a single stage, e.g. superpipelining}	9/44526	. . . .	{Plug-ins; Add-ons}
9/3877	. . . .	{using a slave processor, e.g. coprocessor (peripheral processor <a href="#">G06F 13/12</a> ; vector processor <a href="#">G06F 15/8053</a> )}	9/44536	. . . .	{Selecting among different versions}
9/3879	. . . .	{for non-native instruction execution, e.g. executing a command; for Java instruction set}	9/44542	. . . .	{Retargetable}
9/3881	. . . .	{Arrangements for communication of instructions and data}	9/44547	. . . .	{Fat binaries}
2009/3883	. . . .	{Two-engine architectures, i.e. stand-alone processor acting as a slave processor}	9/44552	. . . .	{Conflict resolution, i.e. enabling coexistence of conflicting executables}
9/3885	. . . .	{using a plurality of independent parallel functional units}	9/44557	. . . .	{Code layout in executable memory}
9/3887	. . . .	{controlled by a single instruction, e.g. SIMD}	9/44563	. . . .	{Sharing}
9/3889	. . . .	{controlled by multiple instructions, e.g. MIMD, decoupled access or execute}	9/44568	. . . .	{Immediately runnable code}
9/3891	. . . .	{organised in groups of units sharing resources, e.g. clusters}	9/44573	. . . .	{Execute-in-place [XIP]}
9/3893	. . . .	{controlled in tandem, e.g. multiplier-accumulator}	9/44578	. . . .	{Preparing or optimising for loading}
9/3895	. . . .	{for complex operations, e.g. multidimensional or interleaved address generators, macros}	9/44584	. . . .	{Portable applications, i.e. making applications self-contained, e.g. U3 standard}
9/3897	. . . .	{with adaptable data path}	9/44589	. . . .	{Program code verification, e.g. Java bytecode verification, proof-carrying code (high-level semantic checks <a href="#">G06F 8/43</a> ; testing and debugging software <a href="#">G06F 11/36</a> )}
9/44	. .	Arrangements for executing specific programs	9/44594	. . . .	{Unloading}
9/4401	. . .	Bootstrapping ( <a href="#">security arrangements therefor G06F 21/57</a> )	9/448	. . .	Execution paradigms, e.g. implementations of programming paradigms
9/4403	. . . .	{Processor initialisation}	9/4482	. . . .	{Procedural}
9/4405	. . . .	{Initialisation of multiprocessor systems}	9/4484	. . . .	{Executing subprograms}
9/4406	. . . .	{Loading of operating system}	9/4486	. . . .	{Formation of subprogram jump address}
9/4408	. . . .	{Boot device selection}	9/4488	. . . .	{Object-oriented}
9/441	. . . .	{Multiboot arrangements, i.e. selecting an operating system to be loaded}	9/449	. . . .	{Object-oriented method invocation or resolution}
9/4411	. . . .	{Configuring for operating with peripheral devices; Loading of device drivers}	9/4491	. . . .	{Optimising based on receiver type}
9/4413	. . . .	{Plug-and-play [PnP]}	9/4492	. . . .	{Inheritance}
9/4415	. . . .	{Self describing peripheral devices}	9/4493	. . . .	{Object persistence}
9/4416	. . . .	{Network booting; Remote initial program loading [RIPL]}	9/4494	. . . .	{data driven}
9/4418	. . . .	{Suspend and resume; Hibernate and awake}	9/4496	. . . .	{Unification in logic programming}
9/442	. . . .	{Shutdown}	9/4498	. . . .	{Finite state machines}
			9/451	. . .	Execution arrangements for user interfaces
			9/452	. . . .	{Remote windowing, e.g. X-Window System, desktop virtualisation ( <a href="#">protocols for telewriting H04L 67/38</a> )}
			9/453	. . . .	{Help systems}
			9/454	. . . .	{Multi-language systems; Localisation; Internationalisation}
			9/455	. . .	Emulation; Interpretation; Software simulation, e.g. virtualisation or emulation of application or operating system execution engines

9/45504	. . . .	{Abstract machines for programme code execution, e.g. Java virtual machine [JVM], interpreters, emulators}	9/4806	. . . .	{Task transfer initiation or dispatching}
9/45508	. . . .	{Runtime interpretation or emulation, e.g. emulator loops, bytecode interpretation}	9/4812	. . . .	{by interrupt, e.g. masked}
9/45512	. . . .	{Command shells}	9/4818	. . . .	{Priority circuits therefor}
9/45516	. . . .	{Runtime code conversion or optimisation}	9/4825	. . . .	{Interrupt from clock, e.g. time of day}
9/4552	. . . .	{Involving translation to a different instruction set architecture, e.g. just-in-time translation in a JVM}	9/4831	. . . .	{with variable priority}
9/45525	. . . .	{Optimisation or modification within the same instruction set architecture, e.g. HP Dynamo}	9/4837	. . . .	{time dependent}
9/45529	. . . .	{Embedded in an application, e.g. JavaScript in a Web browser}	9/4843	. . . .	{by program, e.g. task dispatcher, supervisor, operating system}
9/45533	. . . .	{Hypervisors; Virtual machine monitors}	9/485	. . . .	{Task life-cycle, e.g. stopping, restarting, resuming execution ( <a href="#">G06F 9/4881 takes precedence</a> )}
9/45537	. . . .	{Provision of facilities of other operating environments, e.g. WINE ( <a href="#">I/O emulation G06F 13/105</a> )}	9/4856	. . . .	{resumption being on a different machine, e.g. task migration, virtual machine migration ( <a href="#">G06F 9/5088 takes precedence</a> )}
9/45541	. . . .	{Bare-metal, i.e. hypervisor runs directly on hardware}	9/4862	. . . .	{the task being a mobile agent, i.e. specifically designed to migrate}
9/45545	. . . .	{Guest-host, i.e. hypervisor is an application program itself, e.g. VirtualBox}	9/4868	. . . .	{with creation or replication}
9/4555	. . . .	{Para-virtualisation, i.e. guest operating system has to be modified}	9/4875	. . . .	{with migration policy, e.g. auction, contract negotiation}
9/45554	. . . .	{Instruction set architectures of guest OS and hypervisor or native processor differ, e.g. Bochs or VirtualPC on PowerPC MacOS}	9/4881	. . . .	{Scheduling strategies for dispatcher, e.g. round robin, multi-level priority queues}
9/45558	. . . .	{Hypervisor-specific management and integration aspects}	9/4887	. . . .	{involving deadlines, e.g. rate based, periodic}
2009/45562	. . . .	{Creating, deleting, cloning virtual machine instances}	9/4893	. . . .	{taking into account power or heat criteria ( <a href="#">power management in computers in general G06F 1/3203; thermal management in computers in general G06F 1/206</a> )}
2009/45566	. . . .	{Nested virtual machines}	9/50	. . .	Allocation of resources, e.g. of the central processing unit [CPU]
2009/4557	. . . .	{Distribution of virtual machine instances; Migration and load balancing}	9/5005	. . . .	{to service a request}
2009/45575	. . . .	{Starting, stopping, suspending or resuming virtual machine instances}	9/5011	. . . .	{the resources being hardware resources other than CPUs, Servers and Terminals}
2009/45579	. . . .	{I/O management, e.g. providing access to device drivers or storage}	9/5016	. . . .	{the resource being the memory}
2009/45583	. . . .	{Memory management, e.g. access or allocation}	9/5022	. . . .	{Mechanisms to release resources}
2009/45587	. . . .	{Isolation or security of virtual machine instances}	9/5027	. . . .	{the resource being a machine, e.g. CPUs, Servers, Terminals}
2009/45591	. . . .	{Monitoring or debugging support}	9/5033	. . . .	{considering data affinity}
2009/45595	. . . .	{Network integration; Enabling network access in virtual machine instances}	9/5038	. . . .	{considering the execution order of a plurality of tasks, e.g. taking priority or time dependency constraints into consideration ( <a href="#">scheduling strategies G06F 9/4881 and subgroups</a> )}
9/46	. .	Multiprogramming arrangements	9/5044	. . . .	{considering hardware capabilities}
9/461	. .	{Saving or restoring of program or task context}	9/505	. . . .	{considering the load}
9/462	. . .	{with multiple register sets}	9/5055	. . . .	{considering software capabilities, i.e. software resources associated or available to the machine}
9/463	. . .	{Program control block organisation}	9/5061	. . . .	{Partitioning or combining of resources}
9/465	. . .	{Distributed object oriented systems ( <a href="#">remote method invocation [RMI] G06F 9/548</a> )}	9/5066	. . . .	{Algorithms for mapping a plurality of inter-dependent sub-tasks onto a plurality of physical CPUs ( <a href="#">mapping at compile time, see G06F 8/451</a> )}
9/466	. . .	{Transaction processing}	9/5072	. . . .	{Grid computing}
9/467	. . .	{Transactional memory ( <a href="#">G06F 9/528 takes precedence</a> )}	9/5077	. . . .	{Logical partitioning of resources; Management or configuration of virtualized resources ( <a href="#">specific details on emulation or internal functioning of virtual machines G06F 9/455</a> )}
9/468	. . .	{Specific access rights for resources, e.g. using capability register}	9/5083	. . . .	{Techniques for rebalancing the load in a distributed system}
9/48	. . .	Program initiating; Program switching, e.g. by interrupt	9/5088	. . . .	{involving task migration}

- 9/5094 . . . . {where the allocation takes into account power or heat criteria ([power management in computers in general G06F 1/3203](#); [thermal management in computers in general G06F 1/206](#))}
- 9/52 . . . Program synchronisation; Mutual exclusion, e.g. by means of semaphores
- 9/522 . . . . {Barrier synchronisation}
- 9/524 . . . . {Deadlock detection or avoidance}
- 9/526 . . . . {Mutual exclusion algorithms}
- 9/528 . . . . . {by using speculative mechanisms}
- 9/54 . . . Interprogram communication
- 9/541 . . . . {via adapters, e.g. between incompatible applications}
- 9/542 . . . . {Event management; Broadcasting; Multicasting; Notifications}
- 9/543 . . . . {User-generated data transfer, e.g. clipboards, dynamic data exchange [DDE], object linking and embedding [OLE]}
- 9/544 . . . . {Buffers; Shared memory; Pipes}
- 9/545 . . . . {where tasks reside in different layers, e.g. user- and kernel-space}
- 9/546 . . . . {Message passing systems or structures, e.g. queues}
- 9/547 . . . . {Remote procedure calls [RPC]; Web services}
- 9/548 . . . . . {Object oriented; Remote method invocation [RMI] ([non-remote method invocation G06F 9/449](#))}
- 11/00 Error detection; Error correction; Monitoring**  
(error detection, correction or monitoring in information storage based on relative movement between record carrier and transducer [G11B 20/18](#); monitoring, i.e. supervising the progress of recording or reproducing [G11B 27/36](#); in static stores [G11C 29/00](#))
- NOTE**
- In this group the indexing codes of [G06F 1/00](#) - [G06F 15/00](#) are added
- 11/002 . {protecting against parasitic influences, e.g. noise, temperatures}
- WARNING**
- This group is no longer used for the classification of new documents as from January 1, 2011. The documents are classified in [G06F 11/07](#) and subgroups according to the features used for protecting
- 11/004 . {Error avoidance ([G06F 11/07](#) and subgroups take precedence)}
- 11/006 . {Identification ([G06F 11/2289](#) takes precedence)}
- 11/008 . {Reliability or availability analysis}
- 11/07 . Responding to the occurrence of a fault, e.g. fault tolerance
- 11/0703 . . {Error or fault processing not based on redundancy, i.e. by taking additional measures to deal with the error or fault not making use of redundancy in operation, in hardware, or in data representation}
- 11/0706 . . . {the processing taking place on a specific hardware platform or in a specific software environment}
- 11/0709 . . . . {in a distributed system consisting of a plurality of standalone computer nodes, e.g. clusters, client-server systems}
- 11/0712 . . . . {in a virtual computing platform, e.g. logically partitioned systems}
- 11/0715 . . . . {in a system implementing multitasking ([multitasking per se G06F 9/46](#))}
- 11/0718 . . . . {in an object-oriented system}
- 11/0721 . . . . {within a central processing unit [CPU]}
- 11/0724 . . . . . {in a multiprocessor or a multi-core unit ([multiprocessors per se G06F 15/80](#))}
- 11/0727 . . . . {in a storage system, e.g. in a DASD or network based storage system ([circuits for error detection or correction within digital recording or reproducing units G11B 20/18](#); [drivers for digital recording or reproducing units G06F 3/06](#); [storage area networks H04L 29/08549](#))}
- 11/073 . . . . {in a memory management context, e.g. virtual memory or cache management ([memory management G06F 12/00](#); [testing of static memory units G11C 29/00](#))}
- 11/0733 . . . . {in a data processing system embedded in an image processing device, e.g. printer, facsimile, scanner}
- 11/0736 . . . . {in functional embedded systems, i.e. in a data processing system designed as a combination of hardware and software dedicated to performing a certain function ([testing or monitoring of automated control systems G05B 23/02](#))}
- 11/0739 . . . . . {in a data processing system embedded in automotive or aircraft systems}
- 11/0742 . . . . . {in a data processing system embedded in a mobile device, e.g. mobile phones, handheld devices}
- 11/0745 . . . . {in an input/output transactions management context ([input/output processing in general G06F 13/00](#))}
- 11/0748 . . . . {in a remote unit communicating with a single-box computer node experiencing an error/fault ([remote testing G06F 11/2294](#))}
- 11/0751 . . . {Error or fault detection not based on redundancy ([power supply failures G06F 1/30](#); [network fault management H04L 41/06](#))}
- 11/0754 . . . . {by exceeding limits}
- 11/0757 . . . . . {by exceeding a time limit, i.e. time-out, e.g. watchdogs}
- 11/076 . . . . . {by exceeding a count or rate limit, e.g. word- or bit count limit}
- 11/0763 . . . . {by bit configuration check, e.g. of formats or tags}
- 11/0766 . . . {Error or fault reporting or storing}
- 11/0769 . . . . {Readable error formats, e.g. cross-platform generic formats, human understandable formats}
- 11/0772 . . . . {Means for error signaling, e.g. using interrupts, exception flags, dedicated error registers}
- 11/0775 . . . . {Content or structure details of the error report, e.g. specific table structure, specific error fields}
- 11/0778 . . . . {Dumping, i.e. gathering error/state information after a fault for later diagnosis}

11/0781	. . . . {Error filtering or prioritizing based on a policy defined by the user or on a policy defined by a hardware/software module, e.g. according to a severity level}	11/108	. . . . . {Parity data distribution in semiconductor storages, e.g. in SSD}
11/0784	. . . . {Routing of error reports, e.g. with a specific transmission path or data flow}	11/1084	. . . . . {Degraded mode, e.g. caused by single or multiple storage removals or disk failures}
11/0787	. . . . {Storage of error reports, e.g. persistent data storage, storage using memory protection}	11/1088	. . . . . {Reconstruction on already foreseen single or plurality of spare disks}
11/079	. . . {Root cause analysis, i.e. error or fault diagnosis (in a hardware test environment <a href="#">G06F 11/22</a> ; in a software test environment <a href="#">G06F 11/36</a> )}	11/1092	. . . . . {Rebuilding, e.g. when physically replacing a failing disk}
11/0793	. . . {Remedial or corrective actions (by retry <a href="#">G06F 11/1402</a> ; recovery from an exception in an instruction pipeline <a href="#">G06F 9/3861</a> ; in a network context <a href="#">H04L 29/14</a> )}	11/1096	. . . . . {Parity calculation or recalculation after configuration or reconfiguration of the system}
11/0796	. . {Safety measures, i.e. ensuring safe condition in the event of error, e.g. for controlling element}	11/14	. . Error detection or correction of the data by redundancy in operation ( <a href="#">G06F 11/16</a> takes precedence)
11/08	. . Error detection or correction by redundancy in data representation, e.g. by using checking codes	11/1402	. . . {Saving, restoring, recovering or retrying}
11/085	. . . {using codes with inherent redundancy, e.g. n-out-of-m codes}	11/1405	. . . . {at machine instruction level}
11/10	. . . Adding special bits or symbols to the coded information, e.g. parity check, casting out 9's or 11's	11/1407	. . . . . {Checkpointing the instruction stream}
11/1004	. . . . {to protect a block of data words, e.g. CRC or checksum ( <a href="#">G06F 11/1076</a> takes precedence; security arrangements for protecting computers or computer systems against unauthorized activity <a href="#">G06F 21/00</a> )}	11/141	. . . . . {for bus or memory accesses}
11/1008	. . . . {in individual solid state devices ( <a href="#">G06F 11/1004</a> takes precedence)}	11/1415	. . . . . {at system level}
11/1012	. . . . . {using codes or arrangements adapted for a specific type of error ( <a href="#">G06F 11/1048</a> takes precedence)}	11/1417	. . . . . {Boot up procedures}
11/1016	. . . . . {Error in accessing a memory location, i.e. addressing error}	11/142	. . . . . {Reconfiguring to eliminate the error (group management mechanisms in a peer-to-peer network <a href="#">H04L 67/1044</a> )}
11/102	. . . . . {Error in check bits}	11/1423	. . . . . {by reconfiguration of paths}
11/1024	. . . . . {Identification of the type of error}	11/1425	. . . . . {by reconfiguration of node membership}
11/1028	. . . . . {Adjacent errors, e.g. error in n-bit (n>1) wide storage units, i.e. package error}	11/1428	. . . . . {with loss of hardware functionality}
11/1032	. . . . . {Simple parity}	11/143	. . . . . {with loss of software functionality}
11/1036	. . . . . {Unidirectional errors}	11/1433	. . . . . {during software upgrading}
11/104	. . . . . {using arithmetic codes, i.e. codes which are preserved during operation, e.g. modulo 9 or 11 check}	11/1435	. . . . . {using file system or storage system metadata}
11/1044	. . . . . {with specific ECC/EDC distribution}	11/1438	. . . . . {Restarting or rejuvenating}
11/1048	. . . . . {using arrangements adapted for a specific error detection or correction feature}	11/1441	. . . . . {Resetting or repowering}
11/1052	. . . . . {Bypassing or disabling error detection or correction}	11/1443	. . . . . {Transmit or communication errors}
11/1056	. . . . . {Updating check bits on partial write, i.e. read/modify/write}	11/1446	. . . . {Point-in-time backing up or restoration of persistent data}
11/106	. . . . . {Correcting systematically all correctable errors, i.e. scrubbing}	11/1448	. . . . . {Management of the data involved in backup or backup restore}
11/1064	. . . . . {in cache or content addressable memories}	11/1451	. . . . . {by selection of backup contents}
11/1068	. . . . . {in sector programmable memories, e.g. flash disk ( <a href="#">G06F 11/1072</a> takes precedence)}	11/1453	. . . . . {using de-duplication of the data}
11/1072	. . . . . {in multilevel memories}	11/1456	. . . . . {Hardware arrangements for backup}
11/1076	. . . . {Parity data used in redundant arrays of independent storages, e.g. in RAID systems}	11/1458	. . . . . {Management of the backup or restore process}
		11/1461	. . . . . {Backup scheduling policy}
		11/1464	. . . . . {for networked environments}
		11/1466	. . . . . {to make the backup process non-disruptive}
		11/1469	. . . . . {Backup restoration techniques}
		11/1471	. . . . {involving logging of persistent data for recovery}
		11/1474	. . . . {in transactions ( <a href="#">G06F 16/20</a> takes precedence)}
		11/1476	. . . {in neural networks}
		11/1479	. . . {Generic software techniques for error detection or fault masking}
		11/1482	. . . . {by means of middleware or OS functionality}
		11/1484	. . . . . {involving virtual machines}
		11/1487	. . . . {using N-version programming}
		11/1489	. . . . {through recovery blocks}
		11/1492	. . . . {by run-time replication performed by the application software}
		11/1494	. . . . . {N-modular type}



- 11/1497 . . . {Details of time redundant execution on a single processing unit}
- 11/16 . . Error detection or correction of the data by redundancy in hardware
- 11/1604 . . . {where the fault affects the clock signals of a processing unit and the redundancy is at or within the level of clock signal generation hardware}
- 11/1608 . . . {Error detection by comparing the output signals of redundant hardware ([G06F 11/1629](#), [G06F 11/1666](#) take precedence; error detection or correction in information storage based on relative movement between record carrier and transducer [G11B 20/18](#); checking static stores for correct operation [G11C 29/00](#); for logic circuits [H03K 19/003](#), [H03K 19/007](#); for pulse counters or frequency dividers [H03K 21/40](#))}
- 11/1612 . . . . {where the redundant component is persistent storage}
- 11/1616 . . . . {where the redundant component is an I/O device or an adapter therefor}
- 11/162 . . . . . {Displays}
- 11/1625 . . . . . {in communications, e.g. transmission, interfaces}
- 11/1629 . . . {Error detection by comparing the output of redundant processing systems}
- 11/1633 . . . . {using mutual exchange of the output between the redundant processing components}
- 11/1637 . . . . {using additional compare functionality in one or some but not all of the redundant processing components}
- 11/1641 . . . . {where the comparison is not performed by the redundant processing components}
- 11/1645 . . . . . {and the comparison itself uses redundant hardware}
- 11/165 . . . . {with continued operation after detection of the error}
- 11/1654 . . . . {where the output of only one of the redundant processing components can drive the attached hardware, e.g. memory or I/O}
- 11/1658 . . . {Data re-synchronization of a redundant component, or initial sync of replacement, additional or spare unit}
- 11/1662 . . . . {the resynchronized component or unit being a persistent storage device ([re-synchronization of failed mirror storage G06F 11/2082](#); rebuild or reconstruction of parity RAID storage [G06F 11/1008](#))}
- 11/1666 . . . {where the redundant component is memory or memory area}
- 11/167 . . . . {Error detection by comparing the memory output}
- 11/1675 . . . {Temporal synchronisation or re-synchronisation of redundant processing components}
- 11/1679 . . . . {at clock signal level}
- 11/1683 . . . . {at instruction level}
- 11/1687 . . . . {at event level, e.g. by interrupt or result of polling}
- 11/1691 . . . . {using a quantum}
- 11/1695 . . . {which are operating with time diversity}
- 11/18 . . . . using passive fault-masking of the redundant circuits ([error detection by comparing the output of redundant processing systems with continued operation after detection of the error G06F 11/165](#))}
- 11/181 . . . . {Eliminating the failing redundant component}
- 11/182 . . . . {based on mutual exchange of the output between redundant processing components}
- 11/183 . . . . {by voting, the voting not being performed by the redundant components}
- 11/184 . . . . . {where the redundant components implement processing functionality}
- 11/185 . . . . . {and the voting is itself performed redundantly}
- 11/186 . . . . {Passive fault masking when reading multiple copies of the same data}
- 11/187 . . . . {Voting techniques}
- 11/188 . . . . . {where exact match is not required}
- 11/20 . . . using active fault-masking, e.g. by switching out faulty elements or by switching in spare elements
- 11/2002 . . . . {where interconnections or communication control functionality are redundant ([flexible arrangements for bus networks involving redundancy H04L 12/40176](#))}
- 11/2005 . . . . . {using redundant communication controllers}
- 11/2007 . . . . . {using redundant communication media}
- 11/201 . . . . . {between storage system components}
- 11/2012 . . . . . {and using different communication protocols}
- 11/2015 . . . . {Redundant power supplies ([power supply failure G06F 1/30](#))}
- 11/2017 . . . . {where memory access, memory control or I/O control functionality is redundant ([redundant communication control functionality G06F 11/2005](#); [redundant storage control functionality G06F 11/2089](#))}
- 11/202 . . . . {where processing functionality is redundant ([redundant communication control functionality G06F 11/2005](#), [redundant storage control functionality G06F 11/2089](#))}
- 11/2023 . . . . . {Failover techniques}
- 11/2025 . . . . . {using centralised failover control functionality}
- 11/2028 . . . . . {eliminating a faulty processor or activating a spare}
- 11/203 . . . . . {using migration}
- 11/2033 . . . . . {switching over of hardware resources}
- 11/2035 . . . . . {without idle spare hardware}
- 11/2038 . . . . . {with a single idle spare processing component}
- 11/2041 . . . . . {with more than one idle spare processing component}
- 11/2043 . . . . . {where the redundant components share a common memory address space}
- 11/2046 . . . . . {where the redundant components share persistent storage ([G06F 11/2043 takes precedence](#))}
- 11/2048 . . . . . {where the redundant components share neither address space nor persistent storage}
- 11/2051 . . . . . {in regular structures}

- 11/2053 . . . . {where persistent mass storage functionality or persistent mass storage control functionality is redundant ([error detection or correction in information storage based on relative movement between record carrier and transducer G11B 20/18](#))}
- 11/2056 . . . . . {by mirroring}
- 11/2058 . . . . . {using more than 2 mirrored copies}
- 11/2061 . . . . . {combined with de-clustering of data}
- 11/2064 . . . . . {while ensuring consistency}
- 11/2066 . . . . . {Optimisation of the communication load}
- 11/2069 . . . . . {Management of state, configuration or failover}
- 11/2071 . . . . . {using a plurality of controllers}
- 11/2074 . . . . . {Asynchronous techniques}
- 11/2076 . . . . . {Synchronous techniques}
- 11/2079 . . . . . {Bidirectional techniques}
- 11/2082 . . . . . {Data synchronisation}
- 11/2084 . . . . . {on the same storage unit}
- 11/2087 . . . . . {with a common controller}
- 11/2089 . . . . . {Redundant storage control functionality}
- 11/2092 . . . . . {Techniques of failing over between control units}
- 11/2094 . . . . . {Redundant storage or storage space ([G06F 11/2056 takes precedence](#))}
- 11/2097 . . . . . {maintaining the standby controller/processing unit updated ([initialisation or re-synchronisation thereof G06F 11/1658 and subgroups](#))}
- 11/22 . . . . . Detection or location of defective computer hardware by testing during standby operation or during idle time, e.g. start-up testing
- 11/2205 . . . . {using arrangements specific to the hardware being tested}
- 11/221 . . . . {to test buses, lines or interfaces, e.g. stuck-at or open line faults}
- 11/2215 . . . . {to test error correction or detection circuits}
- 11/2221 . . . . {to test input/output devices or peripheral units}
- 11/2226 . . . . {to test ALU}
- 11/2231 . . . . {to test interrupt circuits}
- 11/2236 . . . . {to test CPU or processors}
- 11/2242 . . . . . {in multi-processor systems, e.g. one processor becoming the test master ([G06F 11/2736 takes precedence](#))}
- 11/2247 . . . . {Verification or detection of system hardware configuration}
- 11/2252 . . . . {using fault dictionaries}
- 11/2257 . . . . {using expert systems}
- 11/2263 . . . . {using neural networks}
- 11/2268 . . . . {Logging of test results}
- 11/2273 . . . . {Test methods}
- 11/2284 . . . . {by power-on test, e.g. power-on self test [POST]}
- 11/2289 . . . . {by configuration test}
- 11/2294 . . . . {by remote test}
- 11/24 . . . . Marginal checking {or other specified testing methods not covered by [G06F 11/26](#), e.g. race tests}
- 11/25 . . . . Testing of logic operation, e.g. by logic analysers
- 11/26 . . . . Functional testing
- 11/261 . . . . {by simulating additional hardware, e.g. fault simulation}
- 11/263 . . . . Generation of test inputs, e.g. test vectors, patterns or sequences {; with adaptation of the tested hardware for testability with external testers}
- 11/2635 . . . . . {using a storage for the test inputs, e.g. test ROM, script files}
- 11/267 . . . . Reconfiguring circuits for testing, e.g. LSSD, partitioning
- 11/27 . . . . Built-in tests
- 11/273 . . . . Tester hardware, i.e. output processing circuits ([G06F 11/263 takes precedence](#))}
- 11/2733 . . . . . {Test interface between tester and unit under test}
- 11/2736 . . . . . {using a dedicated service processor for test}
- 11/277 . . . . . with comparison between actual response and known fault-free response
- 11/28 . . . . by checking the correct order of processing ([G06F 11/08 - G06F 11/26 take precedence](#); [monitoring patterns of pulse trains H03K 5/19](#))
- 11/30 . . . . Monitoring
- 11/3003 . . . . {Monitoring arrangements specially adapted to the computing system or computing system component being monitored}
- 11/3006 . . . . . {where the computing system is distributed, e.g. networked systems, clusters, multiprocessor systems ([multiprogramming arrangements G06F 9/46](#); [allocation of resources G06F 9/50](#))}
- 11/301 . . . . . {where the computing system is a virtual computing platform, e.g. logically partitioned systems ([virtual machines G06F 9/45533](#); [logical partitioning of resources G06F 9/5077](#))}
- 11/3013 . . . . {where the computing system is an embedded system, i.e. a combination of hardware and software dedicated to perform a certain function in mobile devices, printers, automotive or aircraft systems ([testing or monitoring of control systems or parts thereof G05B 23/02](#))}
- 11/3017 . . . . . {where the computing system is implementing multitasking ([multiprogramming arrangements G06F 9/46](#); [allocation of resources G06F 9/50](#))}
- 11/302 . . . . . {where the computing system component is a software system}
- 11/3024 . . . . . {where the computing system component is a central processing unit [CPU]}
- 11/3027 . . . . . {where the computing system component is a bus}
- 11/3031 . . . . . {where the computing system component is a motherboard or an expansion card}
- 11/3034 . . . . . {where the computing system component is a storage system, e.g. DASD based or network based ([digital recording or reproducing G11B 20/18](#); [digital input from or digital output to record carriers G06F 3/06](#); [arrangements and networking functions for distributed storage of data in a network H04L 29/08549](#))}
- 11/3037 . . . . . {where the computing system component is a memory, e.g. virtual memory, cache ([accessing, addressing or allocating within memory systems or architectures G06F 12/00](#); [checking stores for correct operation G11C 29/00](#))}

- 11/3041 . . . {where the computing system component is an input/output interface ([interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units G06F 13/00](#))}
- 11/3044 . . . {where the computing system component is the mechanical casing of the computing system}
- 11/3048 . . . {where the topology of the computing system or computing system component explicitly influences the monitoring activity, e.g. serial, hierarchical systems}
- 11/3051 . . {Monitoring arrangements for monitoring the configuration of the computing system or of the computing system component, e.g. monitoring the presence of processing resources, peripherals, I/O links, software programs ([verification or detection of system hardware configuration G06F 11/2247](#))}
- 11/3055 . . {Monitoring arrangements for monitoring the status of the computing system or of the computing system component, e.g. monitoring if the computing system is on, off, available, not available ([error or fault processing without redundancy G06F 11/0703](#); [error detection or correction by redundancy in data representation G06F 11/08](#); [error detection or correction by redundancy in operation G06F 11/14](#); [error detection or correction by redundancy in hardware G06F 11/16](#))}
- 11/3058 . . {Monitoring arrangements for monitoring environmental properties or parameters of the computing system or of the computing system component, e.g. monitoring of power, currents, temperature, humidity, position, vibrations ([thermal management in cooling arrangements of a computing system G06F 1/206](#))}
- 11/3062 . . . {where the monitored property is the power consumption ([power management in a computing system G06F 1/3203](#))}
- 11/3065 . . {Monitoring arrangements determined by the means or processing involved in reporting the monitored data ([error or fault reporting or logging G06F 11/0766](#))}
- 11/3068 . . . {where the reporting involves data format conversion}
- 11/3072 . . . {where the reporting involves data filtering, e.g. pattern matching, time or event triggered, adaptive or policy-based reporting}
- 11/3075 . . . . {the data filtering being achieved in order to maintain consistency among the monitored data, e.g. ensuring that the monitored data belong to the same timeframe, to the same system or component}
- 11/3079 . . . . {the data filtering being achieved by reporting only the changes of the monitored data}
- 11/3082 . . . . {the data filtering being achieved by aggregating or compressing the monitored data}
- 11/3086 . . . {where the reporting involves the use of self describing data formats, i.e. metadata, markup languages, human readable formats}
- 11/3089 . . {Monitoring arrangements determined by the means or processing involved in sensing the monitored data, e.g. interfaces, connectors, sensors, probes, agents ([software debugging using additional hardware using a specific debug interface G06F 11/3656](#); [performance evaluation by tracing or monitoring G06F 11/3466](#))}
- 11/3093 . . . {Configuration details thereof, e.g. installation, enabling, spatial arrangement of the probes}
- 11/3096 . . . {wherein the means or processing minimize the use of computing system or of computing system component resources, e.g. non-intrusive monitoring which minimizes the probe effect: sniffing, intercepting, indirectly deriving the monitored data from other directly available data}
- 11/32 . . with visual {or acoustical} indication of the functioning of the machine
- 11/321 . . . {Display for diagnostics, e.g. diagnostic result display, self-test user interface}
- 11/322 . . . . {Display of waveforms, e.g. of logic analysers ([G06F 11/323 takes precedence](#))}
- 11/323 . . . {Visualisation of programs or trace data}
- 11/324 . . . {Display of status information}
- 11/325 . . . . {by lamps or LED's}
- 11/326 . . . . . {for error or online/offline status}
- 11/327 . . . . {Alarm or error message display}
- 11/328 . . . . {Computer systems status display ([G06F 11/327 takes precedence](#))}
- 11/34 . . Recording or statistical evaluation of computer activity, e.g. of down time, of input/output operation {; Recording or statistical evaluation of user activity, e.g. usability assessment}
- 11/3404 . . . {for parallel or distributed programming}
- 11/3409 . . . {for performance assessment}
- 11/3414 . . . . {Workload generation, e.g. scripts, playback}
- 11/3419 . . . . . {by assessing time}
- 11/3423 . . . . . {where the assessed time is active or idle time}
- 11/3428 . . . . {Benchmarking}
- 11/3433 . . . . {for load management ([allocation of a server based on load conditions G06F 9/505](#); [load rebalancing G06F 9/5083](#); [redistributing the load in a network by a load balancer H04L 67/1029](#))}
- 11/3438 . . . {monitoring of user actions ([checking the network activity of the user for network-specific applications H04L 67/22](#))}
- 11/3442 . . . {for planning or managing the needed capacity}
- 11/3447 . . . {Performance evaluation by modeling}
- 11/3452 . . . {Performance evaluation by statistical analysis}
- 11/3457 . . . {Performance evaluation by simulation}
- 11/3461 . . . . {Trace driven simulation}
- 11/3466 . . . {Performance evaluation by tracing or monitoring}
- 11/3471 . . . . {Address tracing}
- 11/3476 . . . . {Data logging ([G06F 11/14](#), [G06F 11/2205 take precedence](#))}
- 11/348 . . . . {Circuit details, i.e. tracer hardware}
- 11/3485 . . . . {for I/O devices}
- 11/349 . . . . {for interfaces, buses}

- 11/3495 . . . . {for systems}
- 11/36 . Preventing errors by testing or debugging software
- 11/3604 . . {Software analysis for verifying properties of programs (byte-code verification [G06F 9/44589](#))}
- 11/3608 . . . {using formal methods, e.g. model checking, abstract interpretation (theorem proving [G06N 5/006](#))}
- 11/3612 . . . {by runtime analysis (performance monitoring [G06F 11/3466](#))}
- 11/3616 . . . {using software metrics}
- 11/362 . . {Software debugging}
- 11/3624 . . . {by performing operations on the source code, e.g. via a compiler}
- 11/3628 . . . {of optimised code (optimisation [G06F 8/443](#))}
- 11/3632 . . . {of specific synchronisation aspects}
- 11/3636 . . . {by tracing the execution of the program}
- 11/364 . . . . {tracing values on a bus}
- 11/3644 . . . {by instrumenting at runtime}
- 11/3648 . . . {using additional hardware}
- 11/3652 . . . . {in-circuit-emulation [ICE] arrangements}
- 11/3656 . . . . {using a specific debug interface}
- 11/366 . . . {using diagnostics ([G06F 11/0703](#) takes precedence)}
- 11/3664 . . {Environments for testing or debugging software}
- 11/3668 . . {Software testing (software testing in telephone exchanges [H04M 3/242](#), testing of hardware [G06F 11/22](#))}
- 11/3672 . . . {Test management}
- 11/3676 . . . . {for coverage analysis}
- 11/368 . . . . {for test version control, e.g. updating test cases to a new software version}
- 11/3684 . . . . {for test design, e.g. generating new test cases}
- 11/3688 . . . . {for test execution, e.g. scheduling of test suites}
- 11/3692 . . . . {for test results analysis}
- 11/3696 . . . {Methods or tools to render software testable}
- 12/00** **Accessing, addressing or allocating within memory systems or architectures (digital input from, or digital output to record carriers, e.g. to disk storage units, [G06F 3/06](#))**
- 12/02 . Addressing or allocation; Relocation (program address sequencing [G06F 9/00](#); arrangements for selecting an address in a digital store [G11C 8/00](#))
- 12/0207 . . {with multidimensional access, e.g. row/column, matrix}
- 12/0215 . . {with look ahead addressing means}
- 12/0223 . . {User address space allocation, e.g. contiguous or non contiguous base addressing}
- 12/023 . . . {Free address space management}
- 12/0238 . . . . {Memory management in non-volatile memory, e.g. resistive RAM or ferroelectric memory}
- 12/0246 . . . . . {in block erasable memory, e.g. flash memory}
- 12/0253 . . . . . {Garbage collection, i.e. reclamation of unreferenced memory}
- 12/0261 . . . . . {using reference counting}
- 12/0269 . . . . . {Incremental or concurrent garbage collection, e.g. in real-time systems ([G06F 12/0261](#) takes precedence)}
- 12/0276 . . . . . {Generational garbage collection}
- 12/0284 . . . {Multiple user address space allocation, e.g. using different base addresses (interprocessor communication [G06F 15/163](#))}
- 12/0292 . . . {using tables or multilevel address translation means ([G06F 12/023](#) takes precedence; address translation in virtual memory systems [G06F 12/10](#))}
- 12/04 . . Addressing variable-length words or parts of words
- 12/06 . . Addressing a physical block of locations, e.g. base addressing, module addressing, memory dedication ([G06F 12/08](#) takes precedence)
- NOTE**  
This group is limited to Module addressing or allocation; base addressing is classified in [G06F 12/0223](#).
- 12/0607 . . . {Interleaved addressing}
- 12/0615 . . . {Address space extension}
- 12/0623 . . . . {for memory modules}
- 12/063 . . . . {for I/O modules, e.g. memory mapped I/O (I/O protocol [G06F 13/42](#))}
- 12/0638 . . . {Combination of memories, e.g. ROM and RAM such as to permit replacement or supplementing of words in one module by words in another module (address formation of the next microinstruction [G06F 9/26](#); masking faults in memories by using spares or by reconfiguring [G11C 29/70](#))}
- 12/0646 . . . {Configuration or reconfiguration}
- 12/0653 . . . . {with centralised address assignment}
- 12/0661 . . . . . {and decentralised selection}
- 12/0669 . . . . {with decentralised address assignment}
- 12/0676 . . . . . {the address being position dependent}
- 12/0684 . . . . . {with feedback, e.g. presence or absence of unit detected by addressing, overflow detection}
- 12/0692 . . . . {Multiconfiguration, e.g. local and global addressing}
- 12/08 . . in hierarchically structured memory systems, e.g. virtual memory systems
- 12/0802 . . . Addressing of a memory level in which the access to the desired data or data block requires associative addressing means, e.g. caches
- 12/0804 . . . . with main memory updating ([G06F 12/0806](#) takes precedence)
- 12/0806 . . . . Multisuser, multiprocessor or multiprocessing cache systems
- 12/0808 . . . . . with cache invalidating means ([G06F 12/0815](#) takes precedence)
- 12/0811 . . . . . with multilevel cache hierarchies
- 12/0813 . . . . . with a network or matrix configuration
- 12/0815 . . . . . Cache consistency protocols
- 12/0817 . . . . . using directory methods
- 12/082 . . . . . {Associative directories ([G06F 12/0822](#) takes precedence)}
- 12/0822 . . . . . {Copy directories (local copy tags for implementing a bus snooping protocol [G06F 12/0831](#))}
- 12/0824 . . . . . {Distributed directories, e.g. linked lists of caches}
- 12/0826 . . . . . {Limited pointers directories; State-only directories without pointers}



12/0828	. . . . . {with concurrent directory accessing, i.e. handling multiple concurrent coherency transactions}	12/1045	. . . . . associated with a data cache
12/0831	. . . . . using a bus scheme, e.g. with bus monitoring or watching means	12/1054	. . . . . {the data cache being concurrently physically addressed}
12/0833	. . . . . {in combination with broadcast means (e.g. for invalidation or updating)}	12/1063	. . . . . {the data cache being concurrently virtually addressed}
12/0835	. . . . . {for main memory peripheral accesses (e.g. I/O or DMA)}	12/1072	. . . . . Decentralised address translation, e.g. in distributed shared memory systems
12/0837	. . . . . with software control, e.g. non-cacheable data	12/1081	. . . . . for peripheral access to main memory, e.g. direct memory access [DMA]
12/084	. . . . . with a shared cache	12/109	. . . . . for multiple virtual address spaces, e.g. segmentation ( <a href="#">G06F 12/1036 takes precedence</a> )
12/0842	. . . . . for multiprocessing or multitasking	12/12	. . . . . Replacement control
12/0844	. . . . . Multiple simultaneous or quasi-simultaneous cache accessing	12/121	. . . . . using replacement algorithms
12/0846	. . . . . Cache with multiple tag or data arrays being simultaneously accessible	12/122	. . . . . of the least frequently used [LFU] type, e.g. with individual count value
12/0848	. . . . . {Partitioned cache, e.g. separate instruction and operand caches}	12/123	. . . . . with age lists, e.g. queue, most recently used [MRU] list or least recently used [LRU] list
12/0851	. . . . . {Cache with interleaved addressing}	12/124	. . . . . {being minimized, e.g. non MRU}
12/0853	. . . . . Cache with multiport tag or data arrays	12/125	. . . . . {being generated by decoding an array or storage}
12/0855	. . . . . Overlapped cache accessing, e.g. pipeline ( <a href="#">G06F 12/0846 takes precedence</a> )	12/126	. . . . . with special data handling, e.g. priority of data or instructions, handling errors or pinning
12/0857	. . . . . {by multiple requestors}	12/127	. . . . . using additional replacement algorithms
12/0859	. . . . . {with reload from main memory}	12/128	. . . . . adapted to multidimensional cache systems, e.g. set-associative, multicache, multiset or multilevel
12/0862	. . . . . with prefetch	12/14	. . . . . Protection against unauthorised use of memory {or access to memory}
12/0864	. . . . . using pseudo-associative means, e.g. set-associative or hashing	12/1408	. . . . . {by using cryptography (for digital transmission <a href="#">H04L 9/00</a> )}
12/0866	. . . . . for peripheral storage systems, e.g. disk cache	12/1416	. . . . . {by checking the object accessibility, e.g. type of access defined by the memory independently of subject rights ( <a href="#">G06F 12/1458 takes precedence</a> )}
12/0868	. . . . . Data transfer between cache memory and other subsystems, e.g. storage devices or host systems	12/1425	. . . . . {the protection being physical, e.g. cell, word, block}
12/0871	. . . . . Allocation or management of cache space	12/1433	. . . . . {for a module or a part of a module}
12/0873	. . . . . Mapping of cache memory to specific storage devices or parts thereof	12/1441	. . . . . {for a range}
12/0875	. . . . . with dedicated cache, e.g. instruction or stack	12/145	. . . . . {the protection being virtual, e.g. for virtual blocks or segments before a translation mechanism}
12/0877	. . . . . Cache access modes	12/1458	. . . . . {by checking the subject access rights}
12/0879	. . . . . Burst mode	12/1466	. . . . . {Key-lock mechanism}
12/0882	. . . . . Page mode	12/1475	. . . . . {in a virtual system, e.g. with translation means}
12/0884	. . . . . Parallel mode, e.g. in parallel with main memory or CPU	12/1483	. . . . . {using an access-table, e.g. matrix or list}
12/0886	. . . . . Variable-length word access	12/1491	. . . . . {in a hierarchical protection system, e.g. privilege levels, memory rings}
12/0888	. . . . . using selective caching, e.g. bypass	12/16	. . . . . Protection against loss of memory contents {contains no material, <a href="#">see G06F 11/00</a> }
12/0891	. . . . . using clearing, invalidating or resetting means		
12/0893	. . . . . Caches characterised by their organisation or structure	<b>13/00</b>	<b>Interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units (<a href="#">interface circuits for specific input/output devices G06F 3/00; multiprocessor systems G06F 15/16 {multiprogram control therefor G06F 9/46}</a>)</b>
12/0895	. . . . . of parts of caches, e.g. directory or tag array		
12/0897	. . . . . with two or more cache hierarchy levels ( <a href="#">with multilevel cache hierarchies G06F 12/0811</a> )	13/10	. . . . . Program control for peripheral devices ( <a href="#">G06F 13/14 - G06F 13/42 take precedence</a> )
12/10	. . . . . Address translation		
12/1009	. . . . . using page tables, e.g. page table structures		
12/1018	. . . . . involving hashing techniques, e.g. inverted page tables		
12/1027	. . . . . using associative or pseudo-associative address translation means, e.g. translation look-aside buffer [TLB]		
12/1036	. . . . . for multiple virtual address spaces, e.g. segmentation ( <a href="#">G06F 12/1045 takes precedence</a> )		

- 13/102 . . {where the programme performs an interfacing function, e.g. device driver ([G06F 13/105 takes precedence](#); scheduling within device drivers [G06F 9/52](#); contention policies within device drivers [G06F 9/4881](#))}
- 13/105 . . {where the programme performs an input/output emulation function}
- 13/107 . . . {Terminal emulation}
- 13/12 . . using hardware independent of the central processor, e.g. channel or peripheral processor
- 13/122 . . . {where hardware performs an I/O function other than control of data transfer}
- 13/124 . . . {where hardware is a sequential transfer control unit, e.g. microprocessor, peripheral processor or state-machine}
- 13/126 . . . . {and has means for transferring I/O instructions and statuses between control unit and main processor}
- 13/128 . . . . {for dedicated transfers to a network (for protocol converters [G06F 13/387](#))}
- 13/14 . Handling requests for interconnection or transfer
- 13/16 . . for access to memory bus ([G06F 13/28 takes precedence](#))
- 13/1605 . . . {based on arbitration (arbitration in handling access to a common bus or bus system [G06F 13/36](#))}
- 13/161 . . . . {with latency improvement}
- 13/1615 . . . . . {using a concurrent pipeline structure}
- 13/1621 . . . . . {by maintaining request order}
- 13/1626 . . . . . {by reordering requests}
- 13/1631 . . . . . {through address comparison}
- 13/1636 . . . . . {using refresh}
- 13/1642 . . . . {with request queuing}
- 13/1647 . . . . {with interleaved bank access}
- 13/1652 . . . . {in a multiprocessor architecture (interprocessor communication using common memory [G06F 15/167](#))}
- 13/1657 . . . . . {Access to multiple memories}
- 13/1663 . . . . . {Access to shared memory}
- 13/1668 . . . {Details of memory controller}
- 13/1673 . . . . {using buffers}
- 13/1678 . . . . {using bus width}
- 13/1684 . . . . {using multiple buses}
- 13/1689 . . . . {Synchronisation and timing concerns (synchronisation on a memory bus [G06F 13/4234](#))}
- 13/1694 . . . . {Configuration of memory controller to different memory types}
- 13/18 . . . based on priority control ([G06F 13/1605 takes precedence](#))
- 13/20 . . for access to input/output bus
- 13/22 . . . using successive scanning, e.g. polling ([G06F 13/24 takes precedence](#))
- 13/225 . . . . {with priority control}
- 13/24 . . . using interrupt ([G06F 13/32 takes precedence](#))
- 13/26 . . . . with priority control
- 13/28 . . . using burst mode transfer, e.g. direct memory access {DMA}, cycle steal ([G06F 13/32 takes precedence](#))
- 13/282 . . . . {Cycle stealing DMA ([G06F 13/30 takes precedence](#))}
- 13/285 . . . . {Halt processor DMA ([G06F 13/30 takes precedence](#))}
- 13/287 . . . . {Multiplexed DMA ([G06F 13/30 takes precedence](#))}
- 13/30 . . . . with priority control
- 13/32 . . . using combination of interrupt and burst mode transfer
- 13/34 . . . . with priority control
- 13/36 . . for access to common bus or bus system
- 13/362 . . . with centralised access control
- 13/3625 . . . . {using a time dependent access}
- 13/364 . . . . using independent requests or grants, e.g. using separated request and grant lines
- 13/366 . . . . using a centralised polling arbiter
- 13/368 . . . with decentralised access control
- 13/37 . . . . using a physical-position-dependent priority, e.g. daisy chain, round robin or token passing
- 13/372 . . . . using a time-dependent priority, e.g. individually loaded time counters or time slot
- 13/374 . . . . using a self-select method with individual priority code comparator
- 13/376 . . . . using a contention resolving method, e.g. collision detection, collision avoidance
- 13/378 . . . . using a parallel poll method
- 13/38 . Information transfer, e.g. on bus ([G06F 13/14 takes precedence](#))
- 13/382 . . {using universal interface adapter}
- 13/385 . . . {for adaptation of a particular data processing system to different peripheral devices}
- 13/387 . . . {for adaptation of different data processing systems to different peripheral devices, e.g. protocol converters for incompatible systems, open system}
- 13/40 . . Bus structure {(for computer networks [G06F 15/163](#); for optical bus networks [H04B 10/25](#))}
- 13/4004 . . . {Coupling between buses}
- 13/4009 . . . . {with data restructuring}
- 13/4013 . . . . . {with data re-ordering, e.g. Endian conversion}
- 13/4018 . . . . . {with data-width conversion}
- 13/4022 . . . . {using switching circuits, e.g. switching matrix, connection or expansion network ([G06F 13/4009 takes precedence](#))}
- 13/4027 . . . . {using bus bridges ([G06F 13/4022 takes precedence](#))}
- 13/4031 . . . . . {with arbitration}
- 13/4036 . . . . . {and deadlock prevention}
- 13/404 . . . . {with address mapping}
- 13/4045 . . . . . {where the bus bridge performs an extender function}
- 13/405 . . . . . {where the bridge performs a synchronising function}
- 13/4054 . . . . . {where the function is bus cycle extension, e.g. to meet the timing requirements of the target bus}
- 13/4059 . . . . . {where the synchronisation uses buffers, e.g. for speed matching between buses}
- 13/4063 . . . {Device-to-bus coupling}
- 13/4068 . . . . {Electrical coupling}
- 13/4072 . . . . . {Drivers or receivers ([G06F 13/4086 takes precedence](#); for multistate logic circuits [H03K 19/0002](#))}
- 13/4077 . . . . . {Precharging or discharging}

- 13/4081 . . . . . {Live connection to bus, e.g. hot-plugging (current or voltage limitation during live insertion [H02H 9/004](#))}
- 13/4086 . . . . . {Bus impedance matching, e.g. termination}
- 13/409 . . . . . {Mechanical coupling (back panels [H05K 7/1438](#))}
- 13/4095 . . . . . {in incremental bus architectures, e.g. bus stacks}
- 13/42 . . . Bus transfer protocol, e.g. handshake; Synchronisation
- 13/4204 . . . {on a parallel bus}
- 13/4208 . . . . . {being a system bus, e.g. VME bus, Futurebus, Multibus}
- 13/4213 . . . . . {with asynchronous protocol}
- 13/4217 . . . . . {with synchronous protocol}
- 13/4221 . . . . . {being an input/output bus, e.g. ISA bus, EISA bus, PCI bus, SCSI bus}
- 13/4226 . . . . . {with asynchronous protocol}
- 13/423 . . . . . {with synchronous protocol}
- 13/4234 . . . . . {being a memory bus}
- 13/4239 . . . . . {with asynchronous protocol}
- 13/4243 . . . . . {with synchronous protocol}
- 13/4247 . . . {on a daisy chain bus}
- 13/4252 . . . . . {using a handshaking protocol}
- 13/4256 . . . . . {using a clocked protocol}
- 13/426 . . . . . {using an embedded synchronisation, e.g. Firewire bus, Fibre Channel bus, SSA bus}
- 13/4265 . . . {on a point to point bus ([G06F 13/4247](#), [G06F 13/4282](#) take precedence)}
- 13/4269 . . . . . {using a handshaking protocol, e.g. Centronics connection}
- 13/4273 . . . . . {using a clocked protocol}
- 13/4278 . . . . . {using an embedded synchronisation}
- 13/4282 . . . {on a serial bus, e.g. I2C bus, SPI bus (on daisy chain buses [G06F 13/4247](#))}
- 13/4286 . . . . . {using a handshaking protocol, e.g. RS232C link}
- 13/4291 . . . . . {using a clocked protocol}
- 13/4295 . . . . . {using an embedded synchronisation}
- 15/00 Digital computers in general (details [G06F 1/00](#) – [G06F 13/00](#)); Data processing equipment in general**
- 15/02 . . . manually operated with input through keyboard and computation using a built-in program, e.g. pocket calculators
- 15/0208 . . . {for combination with other devices having a different main function, e.g. watches, pens}
- 15/0216 . . . {Constructional details or arrangements}
- 15/0225 . . . {User interface arrangements, e.g. keyboard, display; Interfaces to other computer systems}
- 15/0233 . . . {with printing provisions}
- 15/0241 . . . {of the IC-card-like type}
- 15/025 . . . {adapted to a specific application}
- 15/0258 . . . {for unit conversion}
- 15/0266 . . . {for time management, e.g. calendars, diaries}
- 15/0275 . . . {for measuring}
- 15/0283 . . . {for data storage and retrieval}
- 15/0291 . . . {for reading, e.g. e-books (constructional details of portable computers [G06F 1/1613](#))}
- 15/04 . . . programmed simultaneously with the introduction of data to be processed, e.g. on the same record carrier
- 15/08 . . . using a plugboard for programming
- 15/10 . . . Tabulators
- 15/12 . . . having provision for both printed and punched output
- 15/14 . . . Calculating-punches
- 15/16 . . . Combinations of two or more digital computers each having at least an arithmetic unit, a program unit and a register, e.g. for a simultaneous processing of several programs {(coordinating program control therefor [G06F 9/52](#); in regulating and control system [G05B](#))}
- 15/161 . . . {Computing infrastructure, e.g. computer clusters, blade chassis or hardware partitioning (casings, cabinets, racks or drawers for data centers [H05K 5/00](#))}
- 15/163 . . . Interprocessor communication
- 15/167 . . . using a common memory, e.g. mailbox
- 15/17 . . . using an input/output type connection, e.g. channel, I/O port
- 15/173 . . . using an interconnection network, e.g. matrix, shuffle, pyramid, star, snowflake
- 15/17306 . . . . . {Intercommunication techniques}
- 15/17312 . . . . . {Routing techniques specific to parallel machines, e.g. wormhole, store and forward, shortest path problem congestion (routing on a LAN [H04L 45/00](#))}
- 15/17318 . . . . . {Parallel communications techniques, e.g. gather, scatter, reduce, roadcast, multicast, all to all}
- 15/17325 . . . . . {Synchronisation; Hardware support therefor (intertask synchronisation [G06F 9/52](#))}
- 15/17331 . . . . . {Distributed shared memory [DSM], e.g. remote direct memory access [RDMA]}
- 15/17337 . . . . . {Direct connection machines, e.g. completely connected computers, point to point communication networks (coupling between buses [G06F 13/4004](#))}
- 15/17343 . . . . . {wherein the interconnection is dynamically configurable, e.g. having loosely coupled nearest neighbor architecture (reconfigurable processors arrays [G06F 15/7867](#))}
- 15/1735 . . . . . {Network adapters, e.g. SCI, Myrinet (protocol engines [H04L 29/06081](#))}
- 15/17356 . . . . . {Indirect interconnection networks}
- 15/17362 . . . . . {hierarchical topologies}
- 15/17368 . . . . . {non hierarchical topologies}
- 15/17375 . . . . . {One dimensional, e.g. linear array, ring}
- 15/17381 . . . . . {Two dimensional, e.g. mesh, torus}
- 15/17387 . . . . . {Three dimensional, e.g. hypercubes}
- 15/17393 . . . . . {having multistage networks, e.g. broadcasting scattering, gathering, hot spot contention, combining/decombining}
- 15/177 . . . Initialisation or configuration control {(processor initialisation [G06F 9/4405](#))}
- 15/76 . . . Architectures of general purpose stored program computers (with program plugboard [G06F 15/08](#); multicomputers [G06F 15/16](#))
- 2015/761 . . . {Indexing scheme relating to architectures of general purpose stored programme computers}
- 2015/763 . . . {ASIC}

2015/765	. . . {Cache}	15/8038	. . . {Associative processors}
2015/766	. . . {Flash EPROM}	15/8046	. . . {Systolic arrays}
2015/768	. . . {Gate array}	15/8053	. . . {Vector processors}
15/78	. . comprising a single central processing unit	15/8061	. . . . {Details on data memory access}
15/7803	. . . {System on board, i.e. computer system on one or more PCB, e.g. motherboards, daughterboards or blades}	15/8069	. . . . . {using a cache}
15/7807	. . . {System on chip, i.e. computer system on a single chip; System in package, i.e. computer system on one or more chips in a single package}	15/8076	. . . . . {Details on data register access}
15/781	. . . . {On-chip cache; Off-chip memory}	15/8084	. . . . . {Special arrangements thereof, e.g. mask or switch}
15/7814	. . . . {Specially adapted for real time processing, e.g. comprising hardware timers}	15/8092	. . . . . {Array of vector units}
15/7817	. . . . {Specially adapted for signal processing, e.g. Harvard architectures}	15/82	. . data or demand driven
15/7821	. . . . {Tightly coupled to memory, e.g. computational memory, smart memory, processor in memory}	15/825	. . . {Dataflow computers}
15/7825	. . . . {Globally asynchronous, locally synchronous, e.g. network on chip}	<b>16/00</b>	<b>Information retrieval; Database structures therefor; File system structures therefor</b>
15/7828	. . . {without memory}	16/10	. File systems; File servers
15/7832	. . . . {on one IC chip (single chip microprocessors)}	16/11	. . File system administration, e.g. details of archiving or snapshots ( <a href="#">file system backup G06F 11/14</a> )
15/7835	. . . . {on more than one IC chip}	16/113	. . . {Details of archiving ( <a href="#">lifecycle management in storage systems G06F 3/0649</a> ; <a href="#">backup systems G06F 11/1446</a> )}
15/7839	. . . {with memory}	16/116	. . . {Details of conversion of file system types or formats}
15/7842	. . . . {on one IC chip (single chip microcontrollers)}	16/119	. . . {Details of migration of file systems ( <a href="#">migration mechanisms in storage systems G06F 3/0647</a> )}
15/7846	. . . . . {On-chip cache and off-chip main memory}	16/122	. . . {using management policies ( <a href="#">backup systems G06F 11/1446</a> ; <a href="#">file migration policies for HSM systems G06F 16/185</a> )}
15/785	. . . . . {with decentralized control, e.g. smart memories}	16/125	. . . . {characterised by the use of retention policies ( <a href="#">retention policies for HSM systems G06F 16/185</a> )}
15/7853	. . . . . {including a ROM}	16/128	. . . {Details of file system snapshots on the file-level, e.g. snapshot creation, administration, deletion ( <a href="#">use of snapshots for error detection or correction G06F 11/14</a> , <a href="#">G06F 11/16</a> )}
15/7857	. . . . . {using interleaved memory ( <a href="#">addressing G06F 12/0607</a> )}	16/13	. . File access structures, e.g. distributed indices ( <a href="#">arrangements of input from, or output to, record carriers G06F 3/06</a> )
15/786	. . . . . {using a single memory module}	16/134	. . . {Distributed indices}
15/7864	. . . . {on more than one IC chip}	16/137	. . . {Hash-based ( <a href="#">content-based indexing of textual data G06F 16/31</a> )}
15/7867	. . . {with reconfigurable architecture}	16/14	. . Details of searching files based on file metadata
15/7871	. . . . {Reconfiguration support, e.g. configuration loading, configuration switching, or hardware OS}	16/144	. . . {Query formulation}
15/7875	. . . . . {for multiple contexts}	16/148	. . . {File search processing}
15/7878	. . . . . {for pipeline reconfiguration}	16/152	. . . . {using file content signatures, e.g. hash values}
15/7882	. . . . . {for self reconfiguration}	16/156	. . . {Query results presentation}
15/7885	. . . . {Runtime interface, e.g. data exchange, runtime control}	16/16	. . File or folder operations, e.g. details of user interfaces specifically adapted to file systems
15/7889	. . . . . {Reconfigurable logic implemented as a co-processor ( <a href="#">instruction execution using a coprocessor G06F 9/3877</a> )}	16/162	. . . {Delete operations ( <a href="#">erasing in storage systems G06F 3/0652</a> )}
15/7892	. . . . . {Reconfigurable logic embedded in CPU, e.g. reconfigurable unit}	16/164	. . . {File meta data generation}
15/7896	. . . {Modular architectures, e.g. assembled from a number of identical packages}	16/166	. . . . {File name conversion}
15/80	. . comprising an array of processing units with common control, e.g. single instruction multiple data processors ( <a href="#">G06F 15/82 takes precedence</a> <a href="#">;</a> <a href="#">for correlation function computation G06F 17/15</a> )	16/168	. . . {Details of user interfaces specifically adapted to file systems, e.g. browsing and visualisation, 2d or 3d GUIs ( <a href="#">query results presentation G06F 16/156</a> )}
15/8007	. . . {single instruction multiple data [SIMD] multiprocessors}	16/17	. . Details of further file system functions
15/8015	. . . . {One dimensional arrays, e.g. rings, linear arrays, buses}	16/172	. . . Caching, prefetching or hoarding of files
15/8023	. . . . {Two dimensional arrays, e.g. mesh, torus}	16/1724	. . . {Details of de-fragmentation performed by the file system ( <a href="#">saving storage space on storage systems G06F 3/0608</a> ; <a href="#">management of blocks in storage devices G06F 3/064</a> )}
15/803	. . . . {Three-dimensional arrays or hypercubes}		



- 16/1727 . . . {Details of free space management performed by the file system (saving storage space on storage systems [G06F 3/0608](#); management of blocks in storage devices [G06F 3/064](#))}
  - 16/173 . . . {Customisation support for file systems, e.g. localisation, multi-language support, personalisation}
  - 16/1734 . . . {Details of monitoring file system events, e.g. by the use of hooks, filter drivers, logs}
  - 16/1737 . . . {for reducing power consumption or coping with limited storage space, e.g. in mobile devices (saving storage space on storage systems [G06F 3/0608](#); power saving in storage systems [G06F 3/0625](#))}
  - 16/174 . . . Redundancy elimination performed by the file system (management of the data involved in backup or backup restore using de-duplication of the data [G06F 11/14](#))
  - 16/1744 . . . . {using compression, e.g. sparse files}
  - 16/1748 . . . . {De-duplication implemented within the file system, e.g. based on file segments (de-duplication techniques in storage systems for the management of data blocks [G06F 3/0641](#))}
  - 16/1752 . . . . . {based on file chunks}
  - 16/1756 . . . . . {based on delta files}
  - 16/176 . . . Support for shared access to files; File sharing support
  - 16/1767 . . . . {Concurrency control, e.g. optimistic or pessimistic approaches}
  - 16/1774 . . . . . {Locking methods, e.g. locking methods for file systems allowing shared and concurrent access to files}
  - 16/178 . . . Techniques for file synchronisation in file systems
  - 16/1787 . . . . {Details of non-transparently synchronising file systems}
  - 16/1794 . . . . {Details of file format conversion}
- WARNING**
- Group [G06F 16/1794](#) is impacted by reclassification into group [G06F 16/258](#). Groups [G06F 16/1794](#) and [G06F 16/258](#) should be considered in order to perform a complete search.
- 16/18 . . File system types
  - 16/1805 . . . {Append-only file systems, e.g. using logs or journals to store data}
  - 16/181 . . . . {providing write once read many [WORM] semantics}
  - 16/1815 . . . . {Journaling file systems}
  - 16/182 . . . Distributed file systems
  - 16/1824 . . . . {implemented using Network-attached Storage [NAS] architecture (distributed or networked storage systems [G06F 3/067](#); protocols for distributed storage of data in a network [H04L 67/1097](#))}
  - 16/1827 . . . . . {Management specifically adapted to NAS (management of storage area networks [SAN] [G06F 3/067](#))}
  - 16/183 . . . . . {Provision of network file services by network file servers, e.g. by using NFS, CIFS (network file access protocols [H04L 67/1097](#))}
  - 16/1834 . . . . . {implemented based on peer-to-peer networks, e.g. gnutella (p2p communication protocols [H04L 67/104](#))}
  - 16/1837 . . . . . {Management specially adapted to peer-to-peer storage networks (topology management mechanisms of peer-to-peer networks [H04L 67/1042](#))}
  - 16/184 . . . . . {implemented as replicated file system}
  - 16/1844 . . . . . {Management specifically adapted to replicated file systems}
  - 16/1847 . . . {specifically adapted to static storage, e.g. adapted to flash memory or SSD}
  - 16/185 . . . Hierarchical storage management [HSM] systems, e.g. file migration or policies thereof (details of archiving [G06F 16/11](#))
  - 16/1858 . . . {Parallel file systems, i.e. file systems supporting multiple processors}
  - 16/1865 . . . {Transactional file systems}
  - 16/1873 . . . {Versioning file systems, temporal file systems, e.g. file system supporting different historic versions of files}
  - 16/188 . . . Virtual file systems
  - 16/192 . . . . {Implementing virtual folder structures}
  - 16/196 . . . . {Specific adaptations of the file system to access devices and non-file objects via standard file system access operations, e.g. pseudo file systems (dedicated interfaces to storage systems [G06F 3/0601](#))}
  - 16/20 . . of structured data, e.g. relational data
  - 16/21 . . Design, administration or maintenance of databases
  - 16/211 . . . {Schema design and management}
  - 16/212 . . . . {with details for data modelling support}
  - 16/213 . . . . {with details for schema evolution support}
  - 16/214 . . . {Database migration support}
  - 16/215 . . . Improving data quality; Data cleansing, e.g. de-duplication, removing invalid entries or correcting typographical errors
  - 16/217 . . . {Database tuning ([G06F 16/2282](#) takes precedence; database performance monitoring [G06F 11/3409](#))}
  - 16/219 . . . {Managing data history or versioning (querying versioned data [G06F 16/2474](#); querying temporal data [G06F 16/2477](#))}
  - 16/22 . . Indexing; Data structures therefor; Storage structures
  - 16/221 . . . {Column-oriented storage; Management thereof}
  - 16/2219 . . . {Large Object storage; Management thereof}
  - 16/2228 . . . {Indexing structures}
  - 16/2237 . . . . {Vectors, bitmaps or matrices}
  - 16/2246 . . . . {Trees, e.g. B+trees}
  - 16/2255 . . . . {Hash tables}
  - 16/2264 . . . . {Multidimensional index structures}
  - 16/2272 . . . . {Management thereof}
  - 16/2282 . . . {Tablespace storage structures; Management thereof}
  - 16/2291 . . . {User-Defined Types; Storage management thereof}

16/23	. . . Updating	16/2428	. . . . {Query predicate definition using graphical user interfaces, including menus and forms ( <a href="#">G06F 16/2423 takes precedence</a> )}
	<b>WARNING</b>	16/243	. . . . {Natural language query formulation}
	Group <a href="#">G06F 16/23</a> is impacted by reclassification into group <a href="#">G06F 16/25</a> .	16/2433	. . . . {Query languages}
	Groups <a href="#">G06F 16/23</a> and <a href="#">G06F 16/25</a> should be considered in order to perform a complete search.	16/2435	. . . . {Active constructs}
16/2308	. . . {Concurrency control (transaction processing <a href="#">G06F 9/466</a> )}	16/2438	. . . . {Embedded query languages}
	<b>WARNING</b>	16/244	. . . . {Grouping and aggregation}
	Group <a href="#">G06F 16/2308</a> is impacted by reclassification into groups <a href="#">G06F 16/2315</a> , <a href="#">G06F 16/2322</a> , <a href="#">G06F 16/2329</a> , <a href="#">G06F 16/2336</a> , and <a href="#">G06F 16/2343</a> .	16/2443	. . . . {Stored procedures}
	All groups listed in this Warning should be considered in order to perform a complete search.	16/2445	. . . . {Data retrieval commands; View definitions}
16/2315	. . . . {Optimistic concurrency control}	16/2448	. . . . {for particular applications; for extensibility, e.g. user defined types}
	<b>WARNING</b>	16/245	. . . . Query processing
	Groups <a href="#">G06F 16/2315</a> - <a href="#">G06F 16/2329</a> are incomplete pending reclassification of documents from group <a href="#">G06F 16/2308</a> .	16/2452	. . . . Query translation
	Groups <a href="#">G06F 16/2308</a> and <a href="#">G06F 16/2315</a> - <a href="#">G06F 16/2329</a> should be considered in order to perform a complete search.	16/24522	. . . . {Translation of natural language queries to structured queries}
16/2322	. . . . {using timestamps}	16/24524	. . . . {Access plan code generation and invalidation; Reuse of access plans}
16/2329	. . . . {using versioning}	16/24526	. . . . {Internal representations for queries}
16/2336	. . . . {Pessimistic concurrency control approaches, e.g. locking or multiple versions without time stamps}	16/24528	. . . . {Standardisation; Simplification}
	<b>WARNING</b>	16/2453	. . . . Query optimisation
	Groups <a href="#">G06F 16/2336</a> and <a href="#">G06F 16/2343</a> are incomplete pending reclassification of documents from group <a href="#">G06F 16/2308</a> .	16/24532	. . . . {of parallel queries}
	Groups <a href="#">G06F 16/2308</a> , <a href="#">G06F 16/2336</a> , and <a href="#">G06F 16/2343</a> should be considered in order to perform a complete search.	16/24534	. . . . {Query rewriting; Transformation}
16/2343	. . . . {Locking methods, e.g. distributed locking or locking implementation details}	16/24535	. . . . {of sub-queries or views}
16/235	. . . {Update request formulation}	16/24537	. . . . {of operators}
16/2358	. . . {Change logging, detection, and notification ( <a href="#">replication G06F 16/27</a> )}	16/24539	. . . . {using cached or materialised query results}
16/2365	. . . {Ensuring data consistency and integrity}	16/2454	. . . . {Optimisation of common expressions}
16/2372	. . . {Updates performed during offline database operations}	16/24542	. . . . {Plan optimisation}
16/2379	. . . {Updates performed during online database operations; commit processing}	16/24544	. . . . {Join order optimisation}
16/2386	. . . {Bulk updating operations ( <a href="#">data conversion details G06F 16/258</a> )}	16/24545	. . . . {Selectivity estimation or determination}
16/2393	. . . {Updating materialised views}	16/24547	. . . . {Optimisations to support specific applications; Extensibility of optimisers}
16/24	. . . Querying	16/24549	. . . . {Run-time optimisation}
16/242	. . . Query formulation	16/2455	. . . . Query execution
16/2423	. . . . {Interactive query statement specification based on a database schema}	16/24552	. . . . {Database cache management}
16/2425	. . . . {Iterative querying; Query formulation based on the results of a preceding query}	16/24553	. . . . {of query operations}
		16/24554	. . . . {Unary operations; Data partitioning operations}
		16/24556	. . . . {Aggregation; Duplicate elimination}
		16/24557	. . . . {Efficient disk access during query execution}
		16/24558	. . . . {Binary matching operations}
		16/2456	. . . . {Join operations}
		16/24561	. . . . {Intermediate data storage techniques for performance improvement}
		16/24562	. . . . {Pointer or reference processing operations}
		16/24564	. . . . {Applying rules; Deductive queries}
		16/24565	. . . . {Triggers; Constraints}
		16/24566	. . . . {Recursive queries}
		16/24568	. . . . {Data stream processing; Continuous queries}
		16/24569	. . . . {Query processing with adaptation to specific hardware, e.g. adapted for using GPUs or SSDs}
		16/2457	. . . . with adaptation to user needs
		16/24573	. . . . {using data annotations, e.g. user-defined metadata}
		16/24575	. . . . {using context}

- 16/24578 . . . . . {using ranking}
- 16/2458 . . . . . Special types of queries, e.g. statistical queries, fuzzy queries or distributed queries
- 16/2462 . . . . . {Approximate or statistical queries}
- 16/2465 . . . . . {Query processing support for facilitating data mining operations in structured databases}
- 16/2468 . . . . . {Fuzzy queries}
- 16/2471 . . . . . {Distributed queries}
- 16/2474 . . . . . {Sequence data queries, e.g. querying versioned data}
- 16/2477 . . . . . {Temporal data queries}
- 16/248 . . . . . Presentation of query results
- 16/25 . . . . . Integrating or interfacing systems involving database management systems

**WARNING**

Group [G06F 16/25](#) is incomplete pending reclassification of documents from group [G06F 16/23](#).

Groups [G06F 16/23](#) and [G06F 16/25](#) should be considered in order to perform a complete search.

- 16/252 . . . . . {between a Database Management System and a front-end application}
- 16/254 . . . . . {Extract, transform and load [ETL] procedures, e.g. ETL data flows in data warehouses}
- 16/256 . . . . . {in federated or virtual databases}
- 16/258 . . . . . {Data format conversion from or to a database}

**WARNING**

Groups [G06F 16/258](#) is incomplete pending reclassification of documents from group [G06F 16/1794](#).

Groups [G06F 16/1794](#) and [G06F 16/258](#) should be considered in order to perform a complete search.

- 16/26 . . . . . Visual data mining; Browsing structured data
- 16/27 . . . . . Replication, distribution or synchronisation of data between databases or within a distributed database system; Distributed database system architectures therefor

**WARNING**

Group [G06F 16/27](#) is impacted by reclassification into groups [G06F 16/273](#), [G06F 16/275](#), and [G06F 16/278](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/273 . . . . . {Asynchronous replication or reconciliation}

**WARNING**

Groups [G06F 16/273](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).

Groups [G06F 16/27](#) and [G06F 16/273](#) should be considered in order to perform a complete search.

- 16/275 . . . . . {Synchronous replication}

**WARNING**

Groups [G06F 16/275](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).

Groups [G06F 16/27](#) and [G06F 16/275](#) should be considered in order to perform a complete search.

- 16/278 . . . . . {Data partitioning, e.g. horizontal or vertical partitioning}

**WARNING**

Groups [G06F 16/278](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).

Groups [G06F 16/27](#) and [G06F 16/278](#) should be considered in order to perform a complete search.

- 16/28 . . . . . Databases characterised by their database models, e.g. relational or object models
- 16/282 . . . . . {Hierarchical databases, e.g. IMS, LDAP data stores or Lotus Notes}
- 16/283 . . . . . {Multi-dimensional databases or data warehouses, e.g. MOLAP or ROLAP}
- 16/284 . . . . . {Relational databases}
- 16/285 . . . . . {Clustering or classification}
- 16/287 . . . . . {Visualization; Browsing}
- 16/288 . . . . . {Entity relationship models}
- 16/289 . . . . . {Object oriented databases}
- 16/29 . . . . . Geographical information databases
- 16/30 . . . . . of unstructured textual data ([document management systems](#) [G06F 16/93](#))

**NOTE**

In groups [G06F 16/30](#), [G06F 16/31](#), [G06F 16/313](#), [G06F 16/316](#), [G06F 16/319](#), [G06F 16/322](#), [G06F 16/325](#), [G06F 16/328](#), [G06F 16/33](#), [G06F 16/332](#), [G06F 16/3322](#), [G06F 16/3323](#), [G06F 16/3325](#), [G06F 16/3326](#), [G06F 16/3328](#), [G06F 16/3329](#), [G06F 16/3331](#), [G06F 16/3332](#), [G06F 16/3334](#), [G06F 16/3335](#), [G06F 16/3337](#), [G06F 16/3338](#), [G06F 16/334](#), [G06F 16/3341](#), [G06F 16/3343](#), [G06F 16/3344](#), [G06F 16/3346](#), [G06F 16/3347](#), [G06F 16/3349](#), [G06F 16/335](#), [G06F 16/337](#), [G06F 16/338](#), [G06F 16/34](#), [G06F 16/345](#), [G06F 16/35](#), [G06F 16/353](#), [G06F 16/355](#), [G06F 16/358](#), [G06F 16/36](#), [G06F 16/367](#) and [G06F 16/374](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/38](#), [G06F 16/381](#), [G06F 16/382](#), [G06F 16/383](#), and [G06F 16/387](#).

- 16/31 . . . . . Indexing; Data structures therefor; Storage structures
- 16/313 . . . . . {Selection or weighting of terms for indexing}
- 16/316 . . . . . {Indexing structures}
- 16/319 . . . . . {Inverted lists}
- 16/322 . . . . . {Trees}
- 16/325 . . . . . {Hash tables}
- 16/328 . . . . . {Management therefor}
- 16/33 . . . . . Querying

- 16/332 . . . Query formulation
- 16/3322 . . . . {using system suggestions ([G06F 16/3325](#) takes precedence)}
- 16/3323 . . . . . {using document space presentation or visualization, e.g. category, hierarchy or range presentation and selection}
- 16/3325 . . . . . {Reformulation based on results of preceding query}
- 16/3326 . . . . . {using relevance feedback from the user, e.g. relevance feedback on documents, documents sets, document terms or passages}
- 16/3328 . . . . . {using graphical result space presentation or visualisation}
- 16/3329 . . . . . {Natural language query formulation or dialogue systems}
- 16/3331 . . . {Query processing}
- 16/3332 . . . . {Query translation}
- 16/3334 . . . . . {Selection or weighting of terms from queries, including natural language queries}
- 16/3335 . . . . . {Syntactic pre-processing, e.g. stopword elimination, stemming}
- 16/3337 . . . . . {Translation of the query language, e.g. Chinese to English}
- 16/3338 . . . . . {Query expansion}
- 16/334 . . . . {Query execution ([G06F 16/335](#) takes precedence)}
- 16/3341 . . . . . {using boolean model}
- 16/3343 . . . . . {using phonetics}
- 16/3344 . . . . . {using natural language analysis}
- 16/3346 . . . . . {using probabilistic model}
- 16/3347 . . . . . {using vector based model}
- 16/3349 . . . . . {Reuse of stored results of previous queries}
- 16/335 . . . Filtering based on additional data, e.g. user or group profiles ([filtering in web context](#) [G06F 16/9535](#), [G06F 16/9536](#))
- 16/337 . . . . {Profile generation, learning or modification}
- 16/338 . . . Presentation of query results
- 16/34 . . Browsing; Visualisation therefor
- 16/345 . . . {Summarisation for human users}
- 16/35 . . Clustering; Classification
- 16/353 . . . {into predefined classes}
- 16/355 . . . {Class or cluster creation or modification}
- 16/358 . . . {Browsing; Visualisation therefor}
- 16/36 . . Creation of semantic tools, e.g. ontology or thesauri
- 16/367 . . . {Ontology}
- 16/374 . . . {Thesaurus}
- 16/38 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

**WARNING**

Group [G06F 16/38](#) is impacted by reclassification into groups [G06F 16/383](#) and [G06F 16/387](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/381 . . . {using identifiers, e.g. barcodes, RFIDs ([for URLs](#) [G06F 16/9554](#))}

- 16/382 . . . {using citations ([hypermedia](#) [G06F 16/94](#))}
- 16/383 . . . using metadata automatically derived from the content

**WARNING**

Group [G06F 16/383](#) is incomplete pending reclassification of documents from group [G06F 16/38](#).

Groups [G06F 16/38](#) and [G06F 16/383](#) should be considered in order to perform a complete search.

- 16/387 . . . using geographical or spatial information, e.g. location

**WARNING**

Group [G06F 16/387](#) is incomplete pending reclassification of documents from group [G06F 16/38](#).

Groups [G06F 16/38](#) and [G06F 16/387](#) should be considered in order to perform a complete search.

- 16/40 . . of multimedia data, e.g. slideshows comprising image and additional audio data ([retrieval of still image data](#) [G06F 16/50](#); [retrieval of audio data](#) [G06F 16/60](#); [retrieval of video data](#) [G06F 16/70](#))

**NOTE**

In groups [G06F 16/40](#), [G06F 16/41](#), [G06F 16/43](#), [G06F 16/432](#), [G06F 16/433](#), [G06F 16/434](#), [G06F 16/435](#), [G06F 16/436](#), [G06F 16/437](#), [G06F 16/438](#), [G06F 16/4387](#), [G06F 16/4393](#), [G06F 16/44](#), [G06F 16/444](#), [G06F 16/447](#) and [G06F 16/45](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#) and [G06F 16/489](#).

**WARNING**

Group [G06F 16/40](#) is impacted by reclassification into groups [G06F 16/45](#), [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#), and [G06F 16/489](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/41 . . Indexing; Data structures therefor; Storage structures
- 16/43 . . Querying

**WARNING**

Group [G06F 16/43](#) is impacted by reclassification into groups [G06F 16/432](#), [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#), and [G06F 16/489](#).

All groups listed in this Warning should be considered in order to perform a complete search.



- 16/432 . . . Query formulation
- WARNING**
- Group [G06F 16/432](#) is incomplete pending reclassification of documents from group [G06F 16/43](#).
- Groups [G06F 16/43](#) and [G06F 16/432](#) should be considered in order to perform a complete search.
- 16/433 . . . . {using audio data}
- 16/434 . . . . {using image data, e.g. images, photos, pictures taken by a user}
- 16/435 . . . Filtering based on additional data, e.g. user or group profiles
- 16/436 . . . . {using biological or physiological data of a human being, e.g. blood pressure, facial expression, gestures}
- 16/437 . . . . {Administration of user profiles, e.g. generation, initialisation, adaptation, distribution}
- 16/438 . . . Presentation of query results
- 16/4387 . . . . {by the use of playlists}
- 16/4393 . . . . . {Multimedia presentations, e.g. slide shows, multimedia albums}
- 16/44 . . Browsing; Visualisation therefor
- 16/444 . . . {Spatial browsing, e.g. 2D maps, 3D or virtual spaces}
- 16/447 . . . {Temporal browsing, e.g. timeline}
- 16/45 . . Clustering; Classification
- WARNING**
- Group [G06F 16/45](#) is incomplete pending reclassification of documents from group [G06F 16/40](#).
- Groups [G06F 16/40](#) and [G06F 16/45](#) should be considered in order to perform a complete search.
- 16/48 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually
- WARNING**
- Group [G06F 16/48](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).
- Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/48](#) should be considered in order to perform a complete search.
- 16/483 . . . using metadata automatically derived from the content
- WARNING**
- Group [G06F 16/483](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).
- Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/483](#) should be considered in order to perform a complete search.

- 16/487 . . . using geographical or spatial information, e.g. location

**WARNING**

Group [G06F 16/487](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/487](#) should be considered in order to perform a complete search.

- 16/489 . . . {using time information}

**WARNING**

Group [G06F 16/489](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/489](#) should be considered in order to perform a complete search.

- 16/50 . . of still image data

**NOTE**

In groups [G06F 16/50](#), [G06F 16/51](#), [G06F 16/53](#), [G06F 16/532](#), [G06F 16/535](#), [G06F 16/538](#), [G06F 16/54](#), [G06F 16/55](#) and [G06F 16/56](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/58](#), [G06F 16/583](#), [G06F 16/5838](#), [G06F 16/5846](#), [G06F 16/5854](#), [G06F 16/5862](#) and [G06F 16/587](#).

**WARNING**

Group [G06F 16/50](#) is impacted by reclassification into groups [G06F 16/53](#), [G06F 16/532](#), [G06F 16/535](#), [G06F 16/538](#), and [G06F 16/55](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/51 . . Indexing; Data structures therefor; Storage structures

- 16/53 . . Querying

**WARNING**

Group [G06F 16/53](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/53](#) should be considered in order to perform a complete search.

- 16/532 . . . Query formulation, e.g. graphical querying

**WARNING**

Group [G06F 16/532](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/532](#) should be considered in order to perform a complete search.

- 16/535 . . . Filtering based on additional data, e.g. user or group profiles

**WARNING**

Group [G06F 16/535](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/535](#) should be considered in order to perform a complete search.

- 16/538 . . . Presentation of query results

**WARNING**

Group [G06F 16/538](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/538](#) should be considered in order to perform a complete search.

- 16/54 . . Browsing; Visualisation therefor

- 16/55 . . Clustering; Classification

**WARNING**

Group [G06F 16/55](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/55](#) should be considered in order to perform a complete search.

- 16/56 . . having vectorial format

- 16/58 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

**WARNING**

Group [G06F 16/58](#) is impacted by reclassification into group [G06F 16/587](#).

Groups [G06F 16/58](#) and [G06F 16/587](#) should be considered in order to perform a complete search.

- 16/583 . . . using metadata automatically derived from the content

- 16/5838 . . . . {using colour}

**WARNING**

Group [G06F 16/5838](#) is impacted by reclassification into groups [G06F 16/5846](#), [G06F 16/5854](#), and [G06F 16/5862](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/5846 . . . . {using extracted text}

**WARNING**

Group [G06F 16/5846](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).

Groups [G06F 16/5838](#) and [G06F 16/5846](#) should be considered in order to perform a complete search.

- 16/5854 . . . . {using shape and object relationship}

**WARNING**

Group [G06F 16/5854](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).

Groups [G06F 16/5838](#) and [G06F 16/5854](#) should be considered in order to perform a complete search.

- 16/5862 . . . . {using texture}

**WARNING**

Group [G06F 16/5862](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).

Groups [G06F 16/5838](#) and [G06F 16/5862](#) should be considered in order to perform a complete search.

- 16/5866 . . . {using information manually generated, e.g. tags, keywords, comments, manually generated location and time information}

**WARNING**

Group [G06F 16/5866](#) is impacted by reclassification into group [G06F 16/587](#).

Groups [G06F 16/5866](#) and [G06F 16/587](#) should be considered in order to perform a complete search.

- 16/587 . . . using geographical or spatial information, e.g. location

**WARNING**

Group [G06F 16/587](#) is incomplete pending reclassification of documents from groups [G06F 16/58](#) and [G06F 16/5866](#).

Groups [G06F 16/58](#), [G06F 16/5866](#), and [G06F 16/587](#) should be considered in order to perform a complete search.

- 16/60 . . of audio data

**NOTE**

In groups [G06F 16/60](#), [G06F 16/61](#), [G06F 16/63](#), [G06F 16/632](#), [G06F 16/634](#), [G06F 16/635](#), [G06F 16/636](#), [G06F 16/637](#), [G06F 16/638](#), [G06F 16/639](#), [G06F 16/64](#), and [G06F 16/65](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/68](#), [G06F 16/683](#), [G06F 16/685](#), [G06F 16/686](#) and [G06F 16/687](#).

**WARNING**

Group [G06F 16/60](#) is impacted by reclassification into groups [G06F 16/63](#) and [G06F 16/65](#).

Groups [G06F 16/60](#), [G06F 16/63](#), and [G06F 16/65](#) should be considered in order to perform a complete search.

- 16/61 . . Indexing; Data structures therefor; Storage structures

- 16/63 . . . Querying
- WARNING**
- Group [G06F 16/63](#) is incomplete pending reclassification of documents from group [G06F 16/60](#).
- Groups [G06F 16/60](#) and [G06F 16/63](#) should be considered in order to perform a complete search.
- 16/632 . . . Query formulation
- 16/634 . . . . {Query by example, e.g. query by humming}
- 16/635 . . . Filtering based on additional data, e.g. user or group profiles
- 16/636 . . . . {by using biological or physiological data}
- 16/637 . . . . {Administration of user profiles, e.g. generation, initialization, adaptation or distribution}
- 16/638 . . . Presentation of query results
- 16/639 . . . . {using playlists}
- 16/64 . . Browsing; Visualisation therefor (generation of a list or set of audio data [G06F 16/638](#))
- 16/65 . . Clustering; Classification
- WARNING**
- Group [G06F 16/65](#) is incomplete pending reclassification of documents from group [G06F 16/60](#).
- Groups [G06F 16/60](#) and [G06F 16/65](#) should be considered in order to perform a complete search.
- 16/68 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually
- WARNING**
- Group [G06F 16/68](#) is impacted by reclassification into group [G06F 16/687](#).
- Groups [G06F 16/68](#) and [G06F 16/687](#) should be considered in order to perform a complete search.
- 16/683 . . . using metadata automatically derived from the content
- 16/685 . . . . {using automatically derived transcript of audio data, e.g. lyrics (speech recognition [G10L 15/00](#))}
- 16/686 . . . {using information manually generated, e.g. tags, keywords, comments, title or artist information, time, location or usage information, user ratings}
- WARNING**
- Group [G06F 16/686](#) is impacted by reclassification into group [G06F 16/687](#).
- Groups [G06F 16/686](#) and [G06F 16/687](#) should be considered in order to perform a complete search.

- 16/687 . . . using geographical or spatial information, e.g. location
- WARNING**
- Group [G06F 16/687](#) is incomplete pending reclassification of documents from groups [G06F 16/68](#) and [G06F 16/686](#).
- Groups [G06F 16/68](#), [G06F 16/686](#), and [G06F 16/687](#) should be considered in order to perform a complete search.
- 16/70 . . of video data
- NOTE**
- In groups [G06F 16/70](#), [G06F 16/71](#), [G06F 16/73](#), [G06F 16/732](#), [G06F 16/7328](#), [G06F 16/7335](#), [G06F 16/7343](#), [G06F 16/735](#), [G06F 16/738](#), [G06F 16/739](#), [G06F 16/74](#), [G06F 16/743](#), [G06F 16/745](#), [G06F 16/78](#) and [G06F 16/75](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/78](#), [G06F 16/783](#), [G06F 16/7834](#), [G06F 16/7837](#), [G06F 16/784](#), [G06F 16/7844](#), [G06F 16/7847](#), [G06F 16/785](#), [G06F 16/7854](#), [G06F 16/7857](#), [G06F 16/786](#), [G06F 16/7864](#), [G06F 16/7867](#) and [G06F 16/787](#).
- WARNING**
- Group [G06F 16/70](#) is impacted by reclassification into group [G06F 16/75](#).
- Groups [G06F 16/70](#) and [G06F 16/75](#) should be considered in order to perform a complete search.
- 16/71 . . Indexing; Data structures therefor; Storage structures
- 16/73 . . Querying
- WARNING**
- Group [G06F 16/73](#) is impacted by reclassification into group [G06F 16/732](#).
- Groups [G06F 16/73](#) and [G06F 16/732](#) should be considered in order to perform a complete search.
- 16/732 . . . Query formulation
- WARNING**
- Group [G06F 16/732](#) is incomplete pending reclassification of documents from group [G06F 16/73](#).
- Groups [G06F 16/73](#) and [G06F 16/732](#) should be considered in order to perform a complete search.
- 16/7328 . . . . {Query by example, e.g. a complete video frame or video sequence (graphical querying [G06F 16/7335](#))}

- 16/7335 . . . . {Graphical querying, e.g. query-by-region, query-by-sketch, query-by-trajectory, GUIs for designating a person/face/object as a query predicate (end-user interface involving hot spots associated with the video [H04N 21/4725](#); end-user interface for selecting a Region of Interest [H04N 21/4728](#))}
- 16/7343 . . . . {Query language or query format}
- 16/735 . . . Filtering based on additional data, e.g. user or group profiles
- 16/738 . . . Presentation of query results
- 16/739 . . . . {in form of a video summary, e.g. the video summary being a video sequence, a composite still image or having synthesized frames}
- 16/74 . . Browsing; Visualisation therefor (end-user interfaces for requesting or interacting with video content, e.g. video on demand interfaces or electronic program guides, [H04N 21/472](#))
- 16/743 . . . {a collection of video files or sequences}
- 16/745 . . . {the internal structure of a single video sequence}
- 16/748 . . . {Hypervideo (linking data to content, e.g. by linking an URL to a video object in the context of video distribution systems [H04N 21/858](#))}
- 16/75 . . Clustering; Classification
- WARNING**
- Group [G06F 16/75](#) is incomplete pending reclassification of documents from group [G06F 16/70](#).
- Groups [G06F 16/70](#) and [G06F 16/75](#) should be considered in order to perform a complete search.
- 16/78 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually
- WARNING**
- Group [G06F 16/78](#) is impacted by reclassification into group [G06F 16/787](#).
- Groups [G06F 16/78](#) and [G06F 16/787](#) should be considered in order to perform a complete search.
- 16/783 . . . using metadata automatically derived from the content
- 16/7834 . . . . {using audio features}
- 16/7837 . . . . {using objects detected or recognised in the video content}
- 16/784 . . . . . {the detected or recognised objects being people}
- 16/7844 . . . . {using original textual content or text extracted from visual content or transcript of audio data}
- 16/7847 . . . . {using low-level visual features of the video content}
- 16/785 . . . . . {using colour or luminescence}
- 16/7854 . . . . . {using shape ([G06F 16/7837](#) takes precedence)}
- 16/7857 . . . . . {using texture ([G06F 16/7837](#) takes precedence)}
- 16/786 . . . . . {using motion, e.g. object motion or camera motion}
- 16/7864 . . . . . {using domain-transform features, e.g. DCT or wavelet transform coefficients}
- 16/7867 . . . {using information manually generated, e.g. tags, keywords, comments, title and artist information, manually generated time, location and usage information, user ratings}
- WARNING**
- Group [G06F 16/7867](#) is impacted by reclassification into group [G06F 16/787](#).
- Groups [G06F 16/7867](#) and [G06F 16/787](#) should be considered in order to perform a complete search.
- 16/787 . . . using geographical or spatial information, e.g. location
- WARNING**
- Group [G06F 16/787](#) is incomplete pending reclassification of documents from groups [G06F 16/78](#) and [G06F 16/7867](#).
- Groups [G06F 16/78](#), [G06F 16/7867](#), and [G06F 16/787](#) should be considered in order to perform a complete search.
- 16/80 . . of semi-structured data, e.g. markup language structured data such as SGML, XML or HTML (content-based retrieval of web data [G06F 16/95](#))
- 16/81 . . Indexing, e.g. XML tags; Data structures therefor; Storage structures
- WARNING**
- Group [G06F 16/81](#) is incomplete pending reclassification of documents from group [G06F 16/83](#).
- Groups [G06F 16/83](#) and [G06F 16/81](#) should be considered in order to perform a complete search.
- 16/83 . . Querying
- WARNING**
- Group [G06F 16/83](#) is impacted by reclassification into groups [G06F 16/81](#) and [G06F 16/835](#).
- Groups [G06F 16/83](#), [G06F 16/81](#), and [G06F 16/835](#) should be considered in order to perform a complete search.
- 16/832 . . . Query formulation
- 16/835 . . . Query processing
- WARNING**
- Group [G06F 16/835](#) is incomplete pending reclassification of documents from group [G06F 16/83](#).
- Groups [G06F 16/83](#) and [G06F 16/835](#) should be considered in order to perform a complete search.
- 16/8358 . . . . {Query translation}
- 16/8365 . . . . {Query optimisation}
- 16/8373 . . . . {Query execution}
- 16/838 . . . Presentation of query results
- 16/84 . . Mapping; Conversion



- 16/86 . . . {Mapping to a database}
- 16/88 . . . {Mark-up to mark-up conversion (conversion for visualization in web browsing G06F 16/9577)}
- 16/90 . Details of database functions independent of the retrieved data types

**NOTE**

In groups [G06F 16/90](#), [G06F 16/901](#), [G06F 16/9014](#), [G06F 16/9017](#), [G06F 16/902](#), [G06F 16/9024](#), [G06F 16/9027](#), [G06F 16/903](#), [G06F 16/9032](#), [G06F 16/90324](#), [G06F 16/90328](#), [G06F 16/90332](#), [G06F 16/90335](#), [G06F 16/90339](#), [G06F 16/90344](#), [G06F 16/90348](#), [G06F 16/9035](#), [G06F 16/9038](#), [G06F 16/904](#), and [G06F 16/906](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/907](#), [G06F 16/907](#), and [G06F 16/909](#).

**WARNING**

Group [G06F 16/90](#) is impacted by reclassification into group [G06F 16/906](#). Groups [G06F 16/90](#) and [G06F 16/906](#) should be considered in order to perform a complete search.

- 16/901 . . Indexing; Data structures therefor; Storage structures (for retrieval from the web [G06F 16/951](#))
- 16/9014 . . . {hash tables}
- 16/9017 . . . {using directory or table look-up (use of a directory or look-up table in file systems [G06F 16/13](#))}
- 16/902 . . . . {using more than one table in sequence, i.e. systems with three or more layers}
- 16/9024 . . . {Graphs; Linked lists ([G06F 16/9027](#) takes precedence)}
- 16/9027 . . . {Trees}
- 16/903 . . Querying (for retrieval from the web [G06F 16/953](#))

**WARNING**

Group [G06F 16/903](#) is impacted by reclassification into group [G06F 16/9035](#). Groups [G06F 16/903](#) and [G06F 16/9035](#) should be considered in order to perform a complete search.

- 16/9032 . . . Query formulation
- 16/90324 . . . . {using system suggestions}
- 16/90328 . . . . . {using search space presentation or visualization, e.g. category or range presentation and selection}
- 16/90332 . . . . {Natural language query formulation or dialogue systems}
- 16/90335 . . . {Query processing}
- 16/90339 . . . . {by using parallel associative memories or content-addressable memories}
- 16/90344 . . . . {by using string matching techniques}
- 16/90348 . . . . {by searching ordered data, e.g. alpha-numerically ordered data}

- 16/9035 . . . Filtering based on additional data, e.g. user or group profiles

**WARNING**

Group [G06F 16/9035](#) is incomplete pending reclassification of documents from group [G06F 16/903](#).

Groups [G06F 16/903](#) and [G06F 16/9035](#) should be considered in order to perform a complete search.

- 16/9038 . . . Presentation of query results
- 16/904 . . Browsing; Visualisation therefor (for navigating the web [G06F 16/954](#); browsing optimisation for the web [G06F 16/957](#))
- 16/906 . . Clustering; Classification

**WARNING**

Group [G06F 16/906](#) is incomplete pending reclassification of documents from group [G06F 16/90](#).

Groups [G06F 16/90](#) and [G06F 16/906](#) should be considered in order to perform a complete search.

- 16/907 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

**WARNING**

Group [G06F 16/907](#) is impacted by reclassification into groups [G06F 16/908](#) and [G06F 16/909](#).

Groups [G06F 16/907](#), [G06F 16/908](#), and [G06F 16/909](#) should be considered in order to perform a complete search.

- 16/908 . . . using metadata automatically derived from the content

**WARNING**

Group [G06F 16/908](#) is incomplete pending reclassification of documents from group [G06F 16/907](#).

Groups [G06F 16/907](#) and [G06F 16/908](#) should be considered in order to perform a complete search.

- 16/909 . . . using geographical or spatial information, e.g. location (spatiotemporally dependent retrieval from the web [G06F 16/9537](#))

**WARNING**

Group [G06F 16/909](#) is incomplete pending reclassification of documents from group [G06F 16/907](#).

Groups [G06F 16/907](#) and [G06F 16/909](#) should be considered in order to perform a complete search.

- 16/93 . . Document management systems
- 16/94 . . . Hyperlinking [G06F 40/134](#)
- 16/95 . . Retrieval from the web

- 16/951 . . . Indexing; Web crawling techniques  
**WARNING**  
 Group [G06F 16/951](#) is impacted by reclassification into groups [G06F 16/953](#), [G06F 16/9532](#) and [G06F 16/9538](#).  
 All groups listed in this Warning should be considered in order to perform a complete search.
- 16/953 . . . Querying, e.g. by the use of web search engines  
**WARNING**  
 Group [G06F 16/953](#) is incomplete pending reclassification of documents from group [G06F 16/951](#).  
 Groups [G06F 16/951](#) and [G06F 16/953](#) should be considered in order to perform a complete search.
- 16/9532 . . . . Query formulation  
**WARNING**  
 Group [G06F 16/9532](#) is incomplete pending reclassification of documents from group [G06F 16/951](#).  
 Groups [G06F 16/951](#) and [G06F 16/9532](#) should be considered in order to perform a complete search.
- 16/9535 . . . . Search customisation based on user profiles and personalisation  
**WARNING**  
 Group [G06F 16/9535](#) is impacted by reclassification into groups [G06F 16/9536](#) and [G06F 16/9538](#).  
 Groups [G06F 16/9535](#), [G06F 16/9536](#), and [G06F 16/9538](#) should be considered in order to perform a complete search.
- 16/9536 . . . . Search customisation based on social or collaborative filtering  
**WARNING**  
 Group [G06F 16/9536](#) is incomplete pending reclassification of documents from group [G06F 16/9535](#).  
 Groups [G06F 16/9535](#) and [G06F 16/9536](#) should be considered in order to perform a complete search.
- 16/9537 . . . . Spatial or temporal dependent retrieval, e.g. spatiotemporal queries
- 16/9538 . . . . Presentation of query results  
**WARNING**  
 Group [G06F 16/9538](#) is incomplete pending reclassification of documents from groups [G06F 16/951](#) and [G06F 16/9535](#).  
 Groups [G06F 16/951](#), [G06F 16/9535](#), and [G06F 16/9538](#) should be considered in order to perform a complete search.
- 16/954 . . . Navigation, e.g. using categorised browsing
- 16/955 . . . using information identifiers, e.g. uniform resource locators [URL]
- 16/9554 . . . . {by using bar codes}
- 16/9558 . . . . {Details of hyperlinks; Management of linked annotations}
- 16/9562 . . . . {Bookmark management}
- 16/9566 . . . . {URL specific, e.g. using aliases, detecting broken or misspelled links}
- 16/957 . . . Browsing optimisation, e.g. caching or content distillation
- 16/9574 . . . . {of access to content, e.g. by caching}
- 16/9577 . . . . {Optimising the visualization of content, e.g. distillation of HTML documents}
- 16/958 . . . Organisation or management of web site content, e.g. publishing, maintaining pages or automatic linking
- 16/972 . . . . {Access to data in other repository systems, e.g. legacy data or dynamic Web page generation}
- 16/986 . . . . {Document structures and storage, e.g. HTML extensions}
- 17/00 Digital computing or data processing equipment or methods, specially adapted for specific functions (information retrieval, database structures or file system structures therefor [G06F 16/00](#))**
- 17/10 . Complex mathematical operations {(function generation by table look-up [G06F 1/03](#); evaluation of elementary functions by calculation [G06F 7/544](#))}
- 17/11 . . for solving equations {, e.g. nonlinear equations, general mathematical optimization problems (optimization specially adapted for a specific administrative, business or logistic context [G06Q 10/04](#))}
- 17/12 . . . Simultaneous equations {, e.g. systems of linear equations}
- 17/13 . . . Differential equations (using digital differential analysers [G06F 7/64](#))
- 17/14 . . Fourier, Walsh or analogous domain transformations {, e.g. Laplace, Hilbert, Karhunen-Loeve, transforms (for correlation function computation [G06F 17/156](#); spectrum analysers [G01R 23/16](#))}
- 17/141 . . . {Discrete Fourier transforms}
- 17/142 . . . . {Fast Fourier transforms, e.g. using a Cooley-Tukey type algorithm}
- 17/144 . . . . {Prime factor Fourier transforms, e.g. Winograd transforms, number theoretic transforms}
- 17/145 . . . {Square transforms, e.g. Hadamard, Walsh, Haar, Hough, Slant transforms}
- 17/147 . . . {Discrete orthonormal transforms, e.g. discrete cosine transform, discrete sine transform, and variations therefrom, e.g. modified discrete cosine transform, integer transforms approximating the discrete cosine transform ([G06F 17/145](#) takes precedence)}
- 17/148 . . . {Wavelet transforms}
- 17/15 . . Correlation function computation {including computation of convolution operations (arithmetic circuits for sum of products *per se*, e.g. multiply-accumulators [G06F 7/5443](#); digital filters, e.g. FIR, IIR, adaptive filters [H03H 17/00](#))}

- 17/153 . . . {Multidimensional correlation or convolution}
- 17/156 . . . {using a domain transform, e.g. Fourier transform, polynomial transform, number theoretic transform}
- 17/16 . . Matrix or vector computation {, e.g. matrix-matrix or matrix-vector multiplication, matrix factorization (matrix transposition [G06F 7/78](#))}
- 17/17 . . Function evaluation by approximation methods, e.g. inter- or extrapolation, smoothing, least mean square method ({[G06F 17/18](#) takes precedence } ; interpolation for numerical control [G05B 19/18](#))
- 17/175 . . . {of multidimensional data}
- 17/18 . . for evaluating statistical data {, e.g. average values, frequency distributions, probability functions, regression analysis (forecasting specially adapted for a specific administrative, business or logistic context [G06Q 10/04](#))}
- 17/40 . Data acquisition and logging (for input to computer [G06F 3/00](#))
- 19/00** **Digital computing or data processing equipment or methods, specially adapted for specific applications** (specially adapted for specific functions [G06F 17/00](#); data processing systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes [G06Q](#); healthcare informatics [G16H](#))  
(Frozen)
- WARNING**  
Group [G06F 19/00](#) is no longer used for the classification of documents as of 02-01-2019. The content of this group is being reclassified into group [G16Z 99/00](#).  
Groups [G06F 19/00](#) and [G16Z 99/00](#) should be considered in order to perform a complete search.
- 21/00** **Security arrangements for protecting computers, components thereof, programs or data against unauthorised activity**
- 21/10 . Protecting distributed programs or content, e.g. vending or licensing of copyrighted material
- 21/105 . . {Tools for software license management or administration, e.g. managing licenses at corporate level}
- 21/12 . . Protecting executable software
- 21/121 . . . {Restricting unauthorised execution of programs}
- 21/123 . . . . {by using dedicated hardware, e.g. dongles, smart cards, cryptographic processors, global positioning systems [GPS] devices}
- 21/125 . . . . {by manipulating the program code, e.g. source code, compiled code, interpreted code, machine code}
- 21/126 . . . . . {Interacting with the operating system}
- 21/128 . . . . . {involving web programs, i.e. using technology especially used in internet, generally interacting with a web browser, e.g. hypertext markup language [HTML], applets, java}
- 21/14 . . . against software analysis or reverse engineering, e.g. by obfuscation
- 21/16 . . Program or content traceability, e.g. by watermarking
- 21/30 . Authentication, i.e. establishing the identity or authorisation of security principals
- 21/305 . . {by remotely controlling device operation}
- 21/31 . . User authentication
- 21/313 . . . {using a call-back technique via a telephone network}
- 21/316 . . . {by observing the pattern of computer usage, e.g. typical user behaviour}
- 21/32 . . . using biometric data, e.g. fingerprints, iris scans or voiceprints
- 21/33 . . . using certificates
- 21/335 . . . . {for accessing specific resources, e.g. using Kerberos tickets}
- 21/34 . . . involving the use of external additional devices, e.g. dongles or smart cards
- 21/35 . . . . communicating wirelessly
- 21/36 . . . by graphic or iconic representation
- 21/40 . . . by quorum, i.e. whereby two or more security principals are required
- 21/41 . . . where a single sign-on provides access to a plurality of computers
- 21/42 . . . using separate channels for security data
- 21/43 . . . . wireless channels
- 21/44 . . Program or device authentication
- 21/445 . . . {by mutual authentication, e.g. between devices or programs}
- 21/45 . . Structures or tools for the administration of authentication
- 21/46 . . . by designing passwords or checking the strength of passwords
- 21/50 . Monitoring users, programs or devices to maintain the integrity of platforms, e.g. of processors, firmware or operating systems
- 21/51 . . at application loading time, e.g. accepting, rejecting, starting or inhibiting executable software based on integrity or source reliability
- 21/52 . . during program execution, e.g. stack integrity {; Preventing unwanted data erasure; Buffer overflow}
- 21/53 . . . by executing in a restricted environment, e.g. sandbox or secure virtual machine
- 21/54 . . . by adding security routines or objects to programs
- 21/55 . . Detecting local intrusion or implementing counter-measures
- 21/552 . . . {involving long-term monitoring or reporting}
- 21/554 . . . {involving event detection and direct action}
- 21/556 . . . {involving covert channels, i.e. data leakage between processes (inhibiting the analysis of circuitry or operation with measures against power attack [G06F 21/755](#))}
- 21/56 . . . Computer malware detection or handling, e.g. anti-virus arrangements
- 21/561 . . . . {Virus type analysis}
- 21/562 . . . . {Static detection}
- 21/563 . . . . . {by source code analysis}
- 21/564 . . . . . {by virus signature recognition}
- 21/565 . . . . . {by checking file integrity}
- 21/566 . . . . {Dynamic detection, i.e. detection performed at run-time, e.g. emulation, suspicious activities}
- 21/567 . . . . {using dedicated hardware}
- 21/568 . . . . {eliminating virus, restoring damaged files}

- 21/57 . . Certifying or maintaining trusted computer platforms, e.g. secure boots or power-downs, version controls, system software checks, secure updates or assessing vulnerabilities

**WARNING**

Group [G06F 21/57](#) - [G06F 21/577](#) is incomplete pending reclassification of documents from groups [G06F 8/65](#), [G06F 8/71](#), and [G06F 9/445](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 21/572 . . . {Secure firmware programming, e.g. of basic input output system [BIOS]}
- 21/575 . . . {Secure boot}
- 21/577 . . . {Assessing vulnerabilities and evaluating computer system security}
- 21/60 . Protecting data
- 21/602 . . {Providing cryptographic facilities or services}
- 21/604 . . {Tools and structures for managing or administering access control systems}
- 21/606 . . {by securing the transmission between two devices or processes}
- 21/608 . . . {Secure printing}
- 21/62 . . Protecting access to data via a platform, e.g. using keys or access control rules
- 21/6209 . . . {to a single file or object, e.g. in a secure envelope, encrypted and accessed using a key, or with access control rules appended to the object itself}
- 21/6218 . . . {to a system of files or objects, e.g. local or distributed file system or database}
- 21/6227 . . . . {where protection concerns the structure of data, e.g. records, types, queries}
- 21/6236 . . . . {between heterogeneous systems}
- 21/6245 . . . . {Protecting personal data, e.g. for financial or medical purposes}
- 21/6254 . . . . . {by anonymising data, e.g. decorrelating personal data from the owner's identification}
- 21/6263 . . . . . {during internet communication, e.g. revealing personal data from cookies}
- 21/6272 . . . . . {by registering files or documents with a third party}
- 21/6281 . . . . . {at program execution time, where the protection is within the operating system}
- 21/629 . . . {to features or functions of an application}
- 21/64 . . Protecting data integrity, e.g. using checksums, certificates or signatures
- 21/645 . . . {using a third party}
- 21/70 . Protecting specific internal or peripheral components, in which the protection of a component leads to protection of the entire computer
- 21/71 . . to assure secure computing or processing of information
- 21/72 . . . in cryptographic circuits
- 21/725 . . . . {operating on a secure reference time value}
- 21/73 . . . by creating or determining hardware identification, e.g. serial numbers
- 21/74 . . . operating in dual or compartmented mode, i.e. at least one secure mode

- 21/75 . . . by inhibiting the analysis of circuitry or operation
- 21/755 . . . . {with measures against power attack}
- 21/76 . . . in application-specific integrated circuits [ASICs] or field-programmable gate arrays [FPGAs] or programmable logic devices [PLDs]
- 21/77 . . . in smart cards
- 21/78 . . to assure secure storage of data (address-based protection against unauthorised use of memory [G06F 12/14](#); record carriers for use with machines and with at least a part designed to carry digital markings [G06K 19/00](#))
- 21/79 . . . in semiconductor storage media, e.g. directly-addressable memories
- 21/80 . . . in storage media based on magnetic or optical technology, e.g. disks with sectors (preventing unauthorised reproduction or copying of disc-type recordable media [G11B 20/00](#))
- 21/805 . . . . {using a security table for the storage sub-system}
- 21/81 . . by operating on the power supply, e.g. enabling or disabling power-on, sleep or resume operations
- 21/82 . . Protecting input, output or interconnection devices
- 21/83 . . . input devices, e.g. keyboards, mice or controllers thereof
- 21/84 . . . output devices, e.g. displays or monitors
- 21/85 . . . interconnection devices, e.g. bus-connected or in-line devices
- 21/86 . . Secure or tamper-resistant housings
- 21/87 . . . by means of encapsulation, e.g. for integrated circuits
- 21/88 . . Detecting or preventing theft or loss

**30/00 Computer-aided design [CAD]****NOTE**

In this group, it is desirable to add the indexing codes of groups [G06F 2111/00](#) - [G06F 2119/00](#).

**WARNING**

Group [G06F 30/00](#) is impacted by reclassification into groups [G06F 30/10](#), [G06F 30/12](#), [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/00](#), [G06F 30/10](#), [G06F 30/12](#), and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/10 . Geometric CAD

**WARNING**

Group [G06F 30/10](#) is incomplete pending reclassification of documents from group [G06F 30/00](#).

Groups [G06F 30/00](#) and [G06F 30/10](#) should be considered in order to perform a complete search.



- 30/12 . . characterised by design entry means specially adapted for CAD, e.g. graphical user interfaces [GUI] specially adapted for CAD
- WARNING**
- Group [G06F 30/12](#) is incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), and [G06F 30/18](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 30/13 . . Architectural design, e.g. computer-aided architectural design [CAAD] related to design of buildings, bridges, landscapes, production plants or roads
- 30/15 . . Vehicle, aircraft or watercraft design
- 30/17 . . Mechanical parametric or variational design
- WARNING**
- Group [G06F 30/17](#) is impacted by reclassification into groups [G06F 30/12](#) and [G06F 2111/00](#) - [G06F 2119/22](#).
- Groups [G06F 30/17](#), [G06F 30/12](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.
- 30/18 . . Network design, e.g. design based on topological or interconnect aspects of utility systems, piping, heating ventilation air conditioning [HVAC] or cabling ([circuit design at the physical level G06F 30/39; network planning tools for wireless communication networks H04W 16/18](#))
- WARNING**
- Group [G06F 30/18](#) is impacted by reclassification into groups [G06F 30/12](#) and [G06F 2111/00](#) - [G06F 2119/22](#).
- Groups [G06F 30/18](#), [G06F 30/12](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.
- 30/20 . . Design optimisation, verification or simulation ([optimisation, verification or simulation of circuit designs G06F 30/30](#))
- WARNING**
- Group [G06F 30/20](#) is impacted by reclassification into groups [G06F 30/25](#), [G06F 30/27](#), [G06F 30/28](#) and [G06F 2111/00](#) - [G06F 2119/22](#).
- Groups [G06F 30/20](#), [G06F 30/25](#), [G06F 30/27](#), [G06F 30/28](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.
- 30/22 . . using Petri net models
- 30/23 . . using finite element methods [FEM] or finite difference methods [FDM]
- WARNING**
- Group [G06F 30/23](#) is impacted by reclassification into groups [G06F 30/25](#), [G06F 30/367](#), [G06F 30/398](#) and [G06F 2111/00](#) - [G06F 2119/22](#).
- Groups [G06F 30/23](#), [G06F 30/25](#), [G06F 30/367](#), [G06F 30/398](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.
- 30/25 . . using particle-based methods
- WARNING**
- Group [G06F 30/25](#) is incomplete pending reclassification of documents from groups [G06F 30/20](#) and [G06F 30/23](#).
- Groups [G06F 30/20](#), [G06F 30/23](#), and [G06F 30/25](#) should be considered in order to perform a complete search.
- 30/27 . . using machine learning, e.g. artificial intelligence, neural networks, support vector machines [SVM] or training a model
- WARNING**
- Group [G06F 30/27](#) is incomplete pending reclassification of documents from group [G06F 30/20](#).
- Groups [G06F 30/20](#) and [G06F 30/27](#) should be considered in order to perform a complete search.
- 30/28 . . using fluid dynamics, e.g. using Navier-Stokes equations or computational fluid dynamics [CFD]
- WARNING**
- Group [G06F 30/28](#) is incomplete pending reclassification of documents from group [G06F 30/20](#).
- Groups [G06F 30/20](#) and [G06F 30/28](#) should be considered
- 30/30 . . Circuit design
- WARNING**
- Group [G06F 30/30](#) is impacted by reclassification into groups [G06F 30/31](#), [G06F 30/32](#), [G06F 30/323](#), [G06F 30/333](#), [G06F 30/337](#), [G06F 30/34](#), [G06F 30/343](#), [G06F 30/347](#), [G06F 30/38](#) and [G06F 2111/00](#) - [G06F 2119/22](#).
- Groups [G06F 30/30](#), [G06F 30/31](#), [G06F 30/32](#), [G06F 30/323](#), [G06F 30/333](#), [G06F 30/337](#), [G06F 30/34](#), [G06F 30/343](#), [G06F 30/347](#), [G06F 30/38](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/31 . . Design entry, e.g. editors specifically adapted for circuit design

**WARNING**

Group [G06F 30/31](#) is incomplete pending reclassification of documents from groups [G06F 30/30](#), [G06F 30/34](#), and [G06F 30/36](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 30/32 . . Circuit design at the digital level ([reconfigurable circuits G06F 30/34](#))

**WARNING**

Group [G06F 30/32](#) is incomplete pending reclassification of documents from group [G06F 30/30](#).

Groups [G06F 30/30](#) and [G06F 30/32](#) should be considered in order to perform a complete search.

- 30/323 . . . Translation or migration, e.g. logic to logic, hardware description language [HDL] translation or netlist translation

**WARNING**

Group [G06F 30/323](#) is incomplete pending reclassification of documents from groups [G06F 30/30](#) and [G06F 30/327](#).

Groups [G06F 30/30](#), [G06F 30/327](#), and [G06F 30/323](#) should be considered in order to perform a complete search.

- 30/327 . . . Logic synthesis; Behaviour synthesis, e.g. mapping logic, HDL to netlist, high-level language to RTL or netlist

**WARNING**

Group [G06F 30/327](#) is impacted by reclassification into groups [G06F 30/323](#) and [G06F 2111/00 - G06F 2119/22](#).

Groups [G06F 30/327](#), [G06F 30/323](#) and [G06F 2111/00 - G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/33 . . . Design verification, e.g. functional simulation or model checking

**WARNING**

Group [G06F 30/33](#) is impacted by reclassification into groups [G06F 30/3308](#), [G06F 30/3315](#) and [G06F 2111/00 - G06F 2119/22](#).

Groups [G06F 30/33](#), [G06F 30/3308](#), [G06F 30/3315](#) and [G06F 2111/00 - G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/3308 . . . . using simulation

**WARNING**

Group [G06F 30/3308](#) is incomplete pending reclassification of documents from group [G06F 30/33](#).

Groups [G06F 30/33](#) and [G06F 30/3308](#) should be considered in order to perform a complete search.

- 30/331 . . . . . with hardware acceleration, e.g. by using field programmable gate array [FPGA] or emulation

- 30/3312 . . . . . Timing analysis

**WARNING**

Group [G06F 30/3312](#) is impacted by reclassification into groups [G06F 30/3315](#) and [G06F 2111/00 - G06F 2119/22](#).

Groups [G06F 30/3312](#), [G06F 30/3315](#) and [G06F 2111/00 - G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/3315 . . . . using static timing analysis [STA]

**WARNING**

Group [G06F 30/3315](#) is incomplete pending reclassification of documents from groups [G06F 30/33](#) and [G06F 30/3312](#).

Groups [G06F 30/33](#), [G06F 30/3312](#), and [G06F 30/3315](#) should be considered in order to perform a complete search.

- 30/3323 . . . . using formal methods, e.g. equivalence checking or property checking

- 30/333 . . . Design for testability [DFT], e.g. scan chain or built-in self-test [BIST]

**WARNING**

Group [G06F 30/333](#) is incomplete pending reclassification of documents from group [G06F 30/30](#).

Groups [G06F 30/30](#) and [G06F 30/333](#) should be considered in order to perform a complete search.

- 30/337 . . . Design optimisation

**WARNING**

Group [G06F 30/337](#) is incomplete pending reclassification of documents from group [G06F 30/30](#).

Groups [G06F 30/30](#) and [G06F 30/337](#) should be considered in order to perform a complete search.

- 30/34 . . . for reconfigurable circuits, e.g. field programmable gate arrays [FPGA] or programmable logic devices [PLD]

**WARNING**

Group [G06F 30/34](#) is incomplete pending reclassification of documents from group [G06F 30/30](#).

Group [G06F 30/34](#) is impacted by reclassification into groups [G06F 30/31](#), [G06F 30/343](#), [G06F 30/347](#) and [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/34](#), [G06F 30/31](#), [G06F 30/343](#), [G06F 30/347](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/343 . . . Logical level

**WARNING**

Group [G06F 30/343](#) is incomplete pending reclassification of documents from groups [G06F 30/30](#) and [G06F 30/34](#).

Groups [G06F 30/30](#), [G06F 30/34](#), and [G06F 30/343](#) should be considered in order to perform a complete search.

- 30/347 . . . Physical level, e.g. placement or routing

**WARNING**

Group [G06F 30/347](#) is incomplete pending reclassification of documents from groups [G06F 30/30](#), [G06F 30/34](#), and [G06F 30/39](#).

Groups [G06F 30/347](#), [G06F 30/30](#), [G06F 30/34](#) and [G06F 30/39](#) should be considered in order to perform a complete search.

- 30/35 . . Delay-insensitive circuit design, e.g. asynchronous or self-timed

- 30/36 . . Circuit design at the analogue level

**WARNING**

Group [G06F 30/36](#) is impacted by reclassification into groups [G06F 30/31](#), [G06F 30/373](#), [G06F 30/38](#) and [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/36](#), [G06F 30/31](#), [G06F 30/373](#), [G06F 30/38](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/367 . . . Design verification, e.g. using simulation, simulation program with integrated circuit emphasis [SPICE], direct methods or relaxation methods

**WARNING**

Group [G06F 30/367](#) is incomplete pending reclassification of documents from group [G06F 30/23](#).

Groups [G06F 30/23](#) and [G06F 30/367](#) should be considered in order to perform a complete search.

- 30/373 . . . Design optimisation

**WARNING**

Group [G06F 30/373](#) is incomplete pending reclassification of documents from group [G06F 30/36](#).

Groups [G06F 30/36](#) and [G06F 30/373](#) should be considered in order to perform a complete search.

- 30/38 . . Circuit design at the mixed level of analogue and digital signals

**WARNING**

Group [G06F 30/38](#) is incomplete pending reclassification of documents from groups [G06F 30/30](#) and [G06F 30/36](#).

Groups [G06F 30/30](#), [G06F 30/36](#), and [G06F 30/38](#) should be considered in order to perform a complete search.

- 30/39 . . Circuit design at the physical level ([physical level design for reconfigurable circuits G06F 30/347](#))

**WARNING**

Group [G06F 30/39](#) is impacted by reclassification into groups [G06F 30/347](#), [G06F 30/396](#), [G06F 30/398](#) and [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/39](#), [G06F 30/347](#), [G06F 30/396](#), [G06F 30/398](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/392 . . . Floor-planning or layout, e.g. partitioning or placement

**WARNING**

Group [G06F 30/392](#) is impacted by reclassification into groups [G06F 30/396](#) and [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/392](#), [G06F 30/396](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/394 . . . Routing ([G06F 30/396 takes precedence](#))

**WARNING**

Group [G06F 30/394](#) is impacted by reclassification into groups [G06F 30/3947](#), [G06F 30/3953](#), [G06F 30/396](#) and [G06F 2111/00](#) - [G06F 2119/22](#).

Groups [G06F 30/394](#), [G06F 30/3947](#), [G06F 30/3953](#), [G06F 30/396](#) and [G06F 2111/00](#) - [G06F 2119/22](#) should be considered in order to perform a complete search.

- 30/3947 . . . . global
- WARNING**
- Group [G06F 30/3947](#) is incomplete pending reclassification of documents from group [G06F 30/394](#).
- Groups [G06F 30/394](#) and [G06F 30/3947](#) should be considered in order to perform a complete search.
- 30/3953 . . . . detailed
- WARNING**
- Group [G06F 30/3953](#) is incomplete pending reclassification of documents from group [G06F 30/394](#).
- Groups [G06F 30/394](#) and [G06F 30/3953](#) should be considered in order to perform a complete search.
- 30/396 . . . Clock trees
- WARNING**
- Group [G06F 30/396](#) is incomplete pending reclassification of documents from groups [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).
- Group [G06F 30/396](#) is also impacted by reclassification into group [G06F 2117/04](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 30/398 . . . Design verification or optimisation, e.g. using design rule check [DRC], layout versus schematics [LVS] or finite element methods [FEM] ([optical proximity correction \[OPC\]](#) design processes [G03F 1/36](#))
- WARNING**
- Group [G06F 30/398](#) is incomplete pending reclassification of documents from groups [G06F 30/23](#) and [G06F 30/39](#).
- Groups [G06F 30/23](#), [G06F 30/39](#) and [G06F 30/398](#) should be considered in order to perform a complete search.
- 40/00 Handling natural language data (speech analysis or synthesis, speech recognition [G10L](#))**
- 40/10 . Text processing ([natural language analysis \[G06F 40/20\]\(#\); semantic analysis \[G06F 40/30\]\(#\); processing or translation of natural language \[G06F 40/40\]\(#\)](#))
- 40/103 . . Formatting, i.e. changing of presentation of documents ([automatic justification \[G06F 40/189\]\(#\); automatic line break hyphenation \[G06F 40/191\]\(#\)](#))
- 40/106 . . . Display of layout of documents; Previewing
- 40/109 . . . Font handling; Temporal or kinetic typography
- 40/111 . . . Mathematical or scientific formatting; Subscripts; Superscripts
- 40/114 . . . Pagination
- 40/117 . . . Tagging; Marking up ([details of markup languages \[G06F 40/143\]\(#\)](#)); Designating a block; Setting of attributes ([style sheets, e.g. eXtensible Stylesheet Language Transformation \[XSLT\], \[G06F 40/154\]\(#\)](#))
- 40/12 . . Use of codes for handling textual entities
- 40/123 . . . Storage facilities
- 40/126 . . . Character encoding
- 40/129 . . . . Handling non-Latin characters, e.g. kana-to-kanji conversion
- 40/131 . . . Fragmentation of text files, e.g. creating reusable text-blocks; Linking to fragments, e.g. using XInclude; Namespaces
- 40/134 . . . Hyperlinking
- 40/137 . . . Hierarchical processing, e.g. outlines
- 40/14 . . . Tree-structured documents ([parsing \[G06F 40/205\]\(#\); validation \[G06F 40/226\]\(#\)](#))
- 40/143 . . . . Markup, e.g. Standard Generalized Markup Language [SGML] or Document Type Definition [DTD]
- 40/146 . . . . Coding or compression of tree-structured data
- 40/149 . . . Adaptation of the text data for streaming purposes, e.g. Efficient XML Interchange [EXI] format
- 40/151 . . . Transformation
- 40/154 . . . . Tree transformation for tree-structured or markup documents, e.g. XSLT, XSL-FO or stylesheets
- 40/157 . . . . using dictionaries or tables
- 40/16 . . . . Automatic learning of transformation rules, e.g. from examples
- 40/163 . . . Handling of whitespace
- 40/166 . . Editing, e.g. inserting or deleting
- 40/169 . . . Annotation, e.g. comment data or footnotes
- 40/171 . . . by use of digital ink
- 40/174 . . . Form filling; Merging
- 40/177 . . . of tables; using ruled lines
- 40/18 . . . . of spreadsheets ([form-filling \[G06F 40/174\]\(#\)](#))
- 40/183 . . . Tabulation, i.e. one-dimensional positioning
- 40/186 . . . Templates
- 40/189 . . Automatic justification
- 40/191 . . Automatic line break hyphenation
- 40/194 . . Calculation of difference between files
- 40/197 . . Version control ([for software \[G06F 8/71\]\(#\)](#))
- 40/20 . Natural language analysis ([semantic analysis of natural language \[G06F 40/30\]\(#\)](#))
- 40/205 . . Parsing
- 40/211 . . . Syntactic parsing, e.g. based on context-free grammar [CFG] or unification grammars
- 40/216 . . . using statistical methods
- 40/221 . . . Parsing markup language streams ([streaming \[G06F 40/149\]\(#\)](#))
- 40/226 . . . Validation
- 40/232 . . Orthographic correction, e.g. spell checking or vowelisation
- 40/237 . . Lexical tools
- 40/242 . . . Dictionaries
- 40/247 . . . Thesauruses; Synonyms
- 40/253 . . Grammatical analysis; Style critique
- 40/258 . . Heading extraction; Automatic titling; Numbering
- 40/263 . . Language identification
- 40/268 . . Morphological analysis
- 40/274 . . Converting codes to words; Guess-ahead of partial word inputs
- 40/279 . . Recognition of textual entities
- 40/284 . . . Lexical analysis, e.g. tokenisation or collocates



- 40/289 . . . Phrasal analysis, e.g. finite state techniques or chunking
- 40/295 . . . . Named entity recognition
- 40/30 . Semantic analysis
- 40/35 . . Discourse or dialogue representation
- 40/40 . Processing or translation of natural language  
([natural language analysis G06F 40/20](#); [semantic analysis G06F 40/30](#))
- 40/42 . . Data-driven translation
- 40/44 . . . Statistical methods, e.g. probability models
- 40/45 . . . Example-based machine translation; Alignment
- 40/47 . . . Machine-assisted translation, e.g. using translation memory
- 40/49 . . . using very large corpora, e.g. the web
- 40/51 . . Translation evaluation
- 40/53 . . Processing of non-Latin text ([kana-to-kanji conversion G06F 40/129](#); [vowelisation G06F 40/232](#))
- 40/55 . . Rule-based translation
- 40/56 . . . Natural language generation
- 40/58 . . Use of machine translation, e.g. for multi-lingual retrieval, for server-side translation for client devices or for real-time translation

#### **2101/00 Indexing scheme relating to the type of digital function generated**

- 2101/02 . Linear multivariable functions, i.e. sum of products
- 2101/04 . Trigonometric functions
- 2101/06 . Co-ordinate transformations
- 2101/08 . Powers or roots
- 2101/10 . Logarithmic or exponential functions
- 2101/12 . Reciprocal functions
- 2101/14 . Probability distribution functions
- 2101/16 . PCM companding functions

#### **Indexing scheme associated with group G06F 30/00, relating to CAD techniques**

##### **2111/00 Details relating to CAD techniques**

###### **WARNING**

Groups [G06F 2111/00](#) - [G06F 2111/20](#) are incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).  
All groups listed in this Warning should be considered in order to perform a complete search.

- 2111/02 . CAD in a network environment, e.g. collaborative CAD or distributed simulation
- 2111/04 . Constraint-based CAD
- 2111/06 . Multi-objective optimisation, e.g. Pareto optimisation using simulated annealing [SA], ant colony algorithms or genetic algorithms [GA]
- 2111/08 . Probabilistic or stochastic CAD
- 2111/10 . Numerical modelling
- 2111/12 . Symbolic schematics
- 2111/14 . related to nanotechnology
- 2111/16 . Customisation or personalisation
- 2111/18 . using virtual or augmented reality

- 2111/20 . Configuration CAD, e.g. designing by assembling or positioning modules selected from libraries of predesigned modules

#### **Indexing scheme associated with group G06F 30/00, relating to the application field**

##### **2113/00 Details relating to the application field**

###### **WARNING**

Groups [G06F 2113/00](#) - [G06F 2113/28](#) are incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2113/02 . Data centres
- 2113/04 . Power grid distribution networks
- 2113/06 . Wind turbines or wind farms
- 2113/08 . Fluids
- 2113/10 . Additive manufacturing, e.g. 3D printing
- 2113/12 . Cloth
- 2113/14 . Pipes
- 2113/16 . Cables, cable trees or wire harnesses
- 2113/18 . Chip packaging
- 2113/20 . Packaging, e.g. boxes or containers
- 2113/22 . Moulding
- 2113/24 . Sheet material
- 2113/26 . Composites
- 2113/28 . Fuselage, exterior or interior

#### **Indexing scheme associated with group G06F 30/00, relating to the type of the circuit**

##### **2115/00 Details relating to the type of the circuit**

###### **WARNING**

Groups [G06F 2115/00](#) - [G06F 2115/12](#) are incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2115/02 . System on chip [SoC] design
- 2115/04 . Micro electro-mechanical systems [MEMS]
- 2115/06 . Structured ASICs
- 2115/08 . Intellectual property [IP] blocks or IP cores
- 2115/10 . Processors
- 2115/12 . Printed circuit boards [PCB] or multi-chip modules [MCM]

**Indexing scheme associated with group G06F 30/00, relating to the type or aim of the circuit design****2117/00 Details relating to the type or aim of the circuit design****WARNING**

Groups [G06F 2117/00](#) - [G06F 2117/12](#) are incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2117/02 . Fault tolerance, e.g. for transient fault suppression
- 2117/04 . Clock gating

**WARNING**

Group [G06F 2117/04](#) is incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), [G06F 30/394](#), and [G06F 30/396](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2117/06 . Spare resources, e.g. for permanent fault suppression
- 2117/08 . HW-SW co-design, e.g. HW-SW partitioning
- 2117/10 . Buffer insertion
- 2117/12 . Sizing, e.g. of transistors or gates

**Indexing scheme associated with group G06F 30/00, relating to the purpose – mostly applicable to circuits – but also relevant for general CAD****2119/00 Details relating to the type or aim of the analysis or the optimisation****WARNING**

Groups [G06F 2119/00](#) - [G06F 2119/22](#) are incomplete pending reclassification of documents from groups [G06F 30/00](#), [G06F 30/17](#), [G06F 30/18](#), [G06F 30/20](#), [G06F 30/23](#), [G06F 30/30](#), [G06F 30/327](#), [G06F 30/33](#), [G06F 30/3312](#), [G06F 30/34](#), [G06F 30/36](#), [G06F 30/39](#), [G06F 30/392](#), and [G06F 30/394](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2119/02 . Reliability analysis or reliability optimisation; Failure analysis, e.g. worst case scenario performance, failure mode and effects analysis [FMEA]
- 2119/04 . Ageing analysis or optimisation against ageing
- 2119/06 . Power analysis or power optimisation
- 2119/08 . Thermal analysis or thermal optimisation
- 2119/10 . Noise analysis or noise optimisation
- 2119/12 . Timing analysis or timing optimisation
- 2119/14 . Force analysis or force optimisation, e.g. static or dynamic forces

- 2119/16 . Equivalence checking
- 2119/18 . Manufacturability analysis or optimisation for manufacturability
- 2119/20 . Design reuse, reusability analysis or reusability optimisation
- 2119/22 . Yield analysis or yield optimisation

**2200/00 Indexing scheme relating to [G06F 1/04](#) - [G06F 1/32](#)**

- 2200/16 . Indexing scheme relating to [G06F 1/16](#) - [G06F 1/18](#)
- 2200/161 . . Indexing scheme relating to constructional details of the monitor
  - 2200/1611 . . . CRT monitor
  - 2200/1612 . . . Flat panel monitor
  - 2200/1613 . . . Supporting arrangements, e.g. for filters or documents associated to a laptop display
- 2200/1614 . . . Image rotation following screen orientation, e.g. switching from landscape to portrait mode
- 2200/163 . . Indexing scheme relating to constructional details of the computer
  - 2200/1631 . . . Panel PC, e.g. single housing hosting PC and display panel
  - 2200/1632 . . . Pen holder integrated in the computer
  - 2200/1633 . . . Protecting arrangement for the entire housing of the computer
  - 2200/1634 . . . Integrated protective display lid, e.g. for touch-sensitive display in handheld computer
  - 2200/1635 . . . Stackable modules
  - 2200/1636 . . . Sensing arrangement for detection of a tap gesture on the housing
  - 2200/1637 . . . Sensing arrangement for detection of housing movement or orientation, e.g. for controlling scrolling or cursor movement on the display of an handheld computer
- 2200/1638 . . . Computer housing designed to operate in both desktop and tower orientation
- 2200/1639 . . . Arrangements for locking plugged peripheral connectors
- 2200/20 . Indexing scheme relating to [G06F 1/20](#)
- 2200/201 . . Cooling arrangements using cooling fluid
- 2200/202 . . Air convective hinge
- 2200/203 . . Heat conductive hinge
- 2200/26 . Indexing scheme relating to [G06F 1/26](#)
- 2200/261 . . PC controlled powerstrip
- 2201/00 Indexing scheme relating to error detection, to error correction, and to monitoring**
  - 2201/80 . Database-specific techniques
  - 2201/805 . Real-time
  - 2201/81 . Threshold
  - 2201/815 . Virtual ([middleware or OS functionality using virtual machines to implement generic software techniques for error detection or fault masking G06F 11/1484](#))
  - 2201/82 . Solving problems relating to consistency ([ensuring consistency in mirrored systems G06F 11/2064](#))
  - 2201/825 . the problem or solution involving locking
  - 2201/83 . the solution involving signatures
  - 2201/835 . Timestamp
  - 2201/84 . Using snapshots, i.e. a logical point-in-time copy of the data
  - 2201/845 . Systems in which the redundancy can be transformed in increased performance

- 2201/85 . . Active fault masking without idle spares ([active fault masking without idle spare hardware where processing functionality is redundant G06F 11/2035](#))
- 2201/855 . . Details of asynchronous mirroring using a journal to transfer not-yet-mirrored changes
- 2201/86 . . Event-based monitoring
- 2201/865 . . Monitoring of software
- 2201/87 . . Monitoring of transactions
- 2201/875 . . Monitoring of systems including the internet
- 2201/88 . . Monitoring involving counting
- 2201/885 . . Monitoring specific for caches
- 2203/00** . . **Indexing scheme relating to [G06F 3/00](#) - [G06F 3/048](#)**
- 2203/01 . . Indexing scheme relating to [G06F 3/01](#)
- 2203/011 . . . Emotion or mood input determined on the basis of sensed human body parameters such as pulse, heart rate or beat, temperature of skin, facial expressions, iris, voice pitch, brain activity patterns
- 2203/012 . . . Walk-in-place systems for allowing a user to walk in a virtual environment while constraining him to a given position in the physical environment
- 2203/013 . . . Force feedback applied to a game
- 2203/014 . . . Force feedback applied to GUI
- 2203/015 . . . Force feedback applied to a joystick
- 2203/033 . . Indexing scheme relating to [G06F 3/033](#)
- 2203/0331 . . . Finger worn pointing device
- 2203/0332 . . . Ergonomic shaped mouse adjustable to suit one of both hands
- 2203/0333 . . . Ergonomic shaped mouse for one hand
- 2203/0334 . . . Ergonomic shaped mouse for vertical grip, whereby the hand controlling the mouse is resting or gripping it with an attitude almost vertical with respect of the working surface
- 2203/0335 . . . Finger operated miniaturized mouse
- 2203/0336 . . . Mouse integrated fingerprint sensor
- 2203/0337 . . . Status LEDs integrated in the mouse to provide visual feedback to the user about the status of the input device, the PC, or the user
- 2203/0338 . . . Fingerprint track pad, i.e. fingerprint sensor used as pointing device tracking the fingertip image
- 2203/0339 . . . Touch strips, e.g. orthogonal touch strips to control cursor movement or scrolling; single touch strip to adjust parameter or to implement a row of soft keys
- 2203/038 . . Indexing scheme relating to [G06F 3/038](#)
- 2203/0381 . . . Multimodal input, i.e. interface arrangements enabling the user to issue commands by simultaneous use of input devices of different nature, e.g. voice plus gesture on digitizer
- 2203/0382 . . . Plural input, i.e. interface arrangements in which a plurality of input device of the same type are in communication with a PC
- 2203/0383 . . . Remote input, i.e. interface arrangements in which the signals generated by a pointing device are transmitted to a PC at a remote location, e.g. to a PC in a LAN
- 2203/0384 . . . Wireless input, i.e. hardware and software details of wireless interface arrangements for pointing devices
- 2203/041 . . Indexing scheme relating to [G06F 3/041](#) - [G06F 3/045](#)
- 2203/04101 . . . 2.5D-digitiser, i.e. digitiser detecting the X/Y position of the input means, finger or stylus, also when it does not touch, but is proximate to the digitiser's interaction surface and also measures the distance of the input means within a short range in the Z direction, possibly with a separate measurement setup
- 2203/04102 . . . Flexible digitiser, i.e. constructional details for allowing the whole digitising part of a device to be flexed or rolled like a sheet of paper
- 2203/04103 . . . Manufacturing, i.e. details related to manufacturing processes specially suited for touch sensitive devices
- 2203/04104 . . . Multi-touch detection in digitiser, i.e. details about the simultaneous detection of a plurality of touching locations, e.g. multiple fingers or pen and finger
- 2203/04105 . . . Pressure sensors for measuring the pressure or force exerted on the touch surface without providing the touch position
- 2203/04106 . . . Multi-sensing digitiser, i.e. digitiser using at least two different sensing technologies simultaneously or alternatively, e.g. for detecting pen and finger, for saving power or for improving position detection
- 2203/04107 . . . Shielding in digitiser, i.e. guard or shielding arrangements, mostly for capacitive touchscreens, e.g. driven shields, driven grounds
- 2203/04108 . . . Touchless 2D- digitiser, i.e. digitiser detecting the X/Y position of the input means, finger or stylus, also when it does not touch, but is proximate to the digitiser's interaction surface without distance measurement in the Z direction
- 2203/04109 . . . FTIR in optical digitiser, i.e. touch detection by frustrating the total internal reflection within an optical waveguide due to changes of optical properties or deformation at the touch location
- 2203/04111 . . . Cross over in capacitive digitiser, i.e. details of structures for connecting electrodes of the sensing pattern where the connections cross each other, e.g. bridge structures comprising an insulating layer, or vias through substrate
- 2203/04112 . . . Electrode mesh in capacitive digitiser: electrode for touch sensing is formed of a mesh of very fine, normally metallic, interconnected lines that are almost invisible to see. This provides a quite large but transparent electrode surface, without need for ITO or similar transparent conductive material
- 2203/04113 . . . Peripheral electrode pattern in resistive digitisers, i.e. electrodes at the periphery of the resistive sheet are shaped in patterns enhancing linearity of induced field
- 2203/04114 . . . Touch screens adapted for alternating or simultaneous interaction with active pens and passive pointing devices like fingers or passive pens
- 2203/048 . . Indexing scheme relating to [G06F 3/048](#)
- 2203/04801 . . . Cursor retrieval aid, i.e. visual aspect modification, blinking, colour changes, enlargement or other visual cues, for helping user do find the cursor in graphical user interfaces

- 2203/04802 . . 3D-info-object: information is displayed on the internal or external surface of a three dimensional manipulable object, e.g. on the faces of a cube that can be rotated by the user
- 2203/04803 . . Split screen, i.e. subdividing the display area or the window area into separate subareas
- 2203/04804 . . Transparency, e.g. transparent or translucent windows
- 2203/04805 . . Virtual magnifying lens, i.e. window or frame movable on top of displayed information to enlarge it for better reading or selection
- 2203/04806 . . Zoom, i.e. interaction techniques or interactors for controlling the zooming operation
- 2203/04807 . . Pen manipulated menu
- 2203/04808 . . Several contacts: gestures triggering a specific function, e.g. scrolling, zooming, right-click, when the user establishes several contacts with the surface simultaneously; e.g. using several fingers or a combination of fingers and pen
- 2203/04809 . . Textured surface identifying touch areas, e.g. overlay structure for a virtual keyboard
- 2205/00 Indexing scheme relating to group [G06F 5/00](#); Methods or arrangements for data conversion without changing the order or content of the data handled**
- 2205/003 . Reformattting, i.e. changing the format of data representation
- 2205/06 . Indexing scheme relating to groups [G06F 5/06](#) - [G06F 5/16](#)
- 2205/061 . . Adapt frequency, i.e. clock frequency at one side is adapted to clock frequency, or average clock frequency, at the other side; Not pulse stuffing only
- 2205/062 . . Allowing rewriting or rereading data to or from the buffer
- 2205/063 . . Dynamically variable buffer size
- 2205/064 . . Linked list, i.e. structure using pointers, e.g. allowing non-contiguous address segments in one logical buffer or dynamic buffer space allocation
- 2205/065 . . With bypass possibility
- 2205/066 . . User-programmable number or size of buffers, i.e. number of separate buffers or their size can be allocated freely
- 2205/067 . . Bidirectional FIFO, i.e. system allowing data transfer in two directions
- 2205/10 . Indexing scheme relating to groups [G06F 5/10](#) - [G06F 5/14](#)
- 2205/102 . . Avoiding metastability, i.e. preventing hazards, e.g. by using Gray code counters
- 2205/104 . . Delay lines
- 2205/106 . . Details of pointers, i.e. structure of the address generators
- 2205/108 . . Reading or writing the data blockwise, e.g. using an extra end-of-block pointer
- 2205/12 . Indexing scheme relating to groups [G06F 5/12](#) - [G06F 5/14](#)
- 2205/123 . . Contention resolution, i.e. resolving conflicts between simultaneous read and write operations
- 2205/126 . . Monitoring of intermediate fill level, i.e. with additional means for monitoring the fill level, e.g. half full flag, almost empty flag
- 2206/00 Indexing scheme related to dedicated interfaces for computers**
- 2206/10 . Indexing scheme related to storage interfaces for computers, indexing schema related to group [G06F 3/06](#)
- 2206/1004 . . Defragmentation
- 2206/1008 . . Graphical user interface [GUI]
- 2206/1012 . . Load balancing
- 2206/1014 . . One time programmable [OTP] memory, e.g. PROM, WORM
- 2206/15 . Indexing scheme related to printer interfaces for computers, indexing schema related to group [G06F 3/12](#)
- 2206/1504 . . Cost estimation
- 2206/1506 . . Degraded mode, e.g. in view of consumables depleted, thresholds reached
- 2206/1508 . . Load balancing
- 2206/151 . . Pre-printed media, e.g. media stock, forms, logos
- 2206/1512 . . Print-to a presentation device other than a printer, e.g. e-reader, e-paper, tablet
- 2206/1514 . . Sub-job
- 2206/20 . Indexing scheme related to audio interfaces for computers, indexing schema related to group [G06F 3/16](#)
- 2207/00 Indexing scheme relating to methods or arrangements for processing data by operating upon the order or content of the data handled**
- 2207/02 . Indexing scheme relating to groups [G06F 7/02](#) - [G06F 7/026](#)
- 2207/025 . . String search, i.e. pattern matching, e.g. find identical word or best match in a string
- 2207/22 . Indexing scheme relating to groups [G06F 7/22](#) - [G06F 7/36](#)
- 2207/222 . . Binary data tree
- 2207/224 . . External sorting
- 2207/226 . . Priority queue, i.e. 1 word in, 1 word out sorter; Output word, i.e. min or max of words in memory
- 2207/228 . . Sorting or merging network
- 2207/38 . Indexing scheme relating to groups [G06F 7/38](#) - [G06F 7/575](#)
- 2207/3804 . . Details
- 2207/3808 . . . concerning the type of numbers or the way they are handled
- 2207/3812 . . . . Devices capable of handling different types of numbers
- 2207/3816 . . . . . Accepting numbers of variable word length
- 2207/382 . . . . . Reconfigurable for different fixed word lengths ([multigauge devices G06F 2207/3828](#))
- 2207/3824 . . . . . Accepting both fixed-point and floating-point numbers
- 2207/3828 . . . . . Multigauge devices, i.e. capable of handling packed numbers without unpacking them
- 2207/3832 . . . . . Less usual number representations
- 2207/3836 . . . . . One's complement
- 2207/384 . . . . . Octal
- 2207/3844 . . . . . Hexadecimal
- 2207/3848 . . . . . Unit distance code
- 2207/3852 . . . . . Calculation with most significant digit first
- 2207/3856 . . . . . Operand swapping
- 2207/386 . . . Special constructional features
- 2207/3864 . . . . . Clockless, i.e. asynchronous operation used as a design principle ([G06F 2207/3888 takes precedence](#))



- 2207/3868 . . . . Bypass control, i.e. possibility to transfer an operand unchanged to the output
- 2207/3872 . . . . Precharge of output to prevent leakage
- 2207/3876 . . . . Alternation of true and inverted stages
- 2207/388 . . . . Skewing
- 2207/3884 . . . . Pipelining
- 2207/3888 . . . . . Wave pipelining, i.e. processing multiple subsequent operand sets asynchronously within each pipeline stage
- 2207/3892 . . . . . Systolic array
- 2207/3896 . . . . Bit slicing
- 2207/48 . . . Indexing scheme relating to groups  
[G06F 7/48](#) - [G06F 7/575](#)
- 2207/4802 . . . Special implementations
- 2207/4804 . . . . Associative memory or processor
- 2207/4806 . . . . Cascode or current mode logic
- 2207/4808 . . . . Charge transfer devices
- 2207/481 . . . . Counters performing arithmetic operations
- 2207/4812 . . . . Multiplexers
- 2207/4814 . . . . Non-logic devices, e.g. operational amplifiers
- 2207/4816 . . . . Pass transistors
- 2207/4818 . . . . Threshold devices
- 2207/482 . . . . . using capacitive adding networks
- 2207/4822 . . . . . Majority gates
- 2207/4824 . . . . . Neural networks
- 2207/4826 . . . . . using transistors having multiple electrodes of the same type, e.g. multi-emitter devices, neuron-MOS devices
- 2207/4828 . . . . Negative resistance devices, e.g. tunnel diodes, gunn effect devices
- 2207/483 . . . Indexing scheme relating to group [G06F 7/483](#)
- 2207/4835 . . . Computations with rational numbers
- 2207/491 . . . Indexing scheme relating to groups  
[G06F 7/491](#) - [G06F 7/4917](#)
- 2207/49105 . . . Determining 9's or 10's complement
- 2207/4911 . . . Decimal floating-point representation
- 2207/49115 . . . Duodecimal numbers
- 2207/4912 . . . Non-specified BCD representation
- 2207/49125 . . . Non-specified decimal representation
- 2207/4913 . . . Sterling system, i.e. mixed radix with digit weights of 10-20-12
- 2207/49135 . . . Using 036012 or 3612 code, i.e. binary coded decimal representation with digit weight of (0,) 3, 6, (0,) 1 and 2 respectively
- 2207/4914 . . . Using 2-out-of-5 code, i.e. binary coded decimal representation with digit weight of 2, 4, 2 and 1 respectively
- 2207/49145 . . . Using 2421 code, i.e. non-weighted representation in which 2 out of 5 bits are "1" for each decimal digit
- 2207/4915 . . . Using 4221 code, i.e. binary coded decimal representation with digit weight of 4, 2, 2 and 1 respectively
- 2207/49155 . . . Using 51111 code, i.e. binary coded decimal representation with digit weight of 5, 1, 1, 1 and 1 respectively
- 2207/4916 . . . Using 5211 code, i.e. binary coded decimal representation with digit weight of 5, 2, 1 and 1 respectively
- 2207/49165 . . . Using 5311 code, i.e. binary coded decimal representation with digit weight of 5, 3, 1 and 1 respectively
- 2207/4917 . . . Using 5321 or 543210 code, i.e. binary coded decimal representation with digit weight of 5,(4,) 3, 2, 1 (and 0) respectively
- 2207/49175 . . . Using 54321 code, i.e. binary coded decimal representation with digit weight of 5, 4, 3, 2 and 1 respectively
- 2207/4918 . . . Using Aiken code, i.e. using both first and last 5 of 16 possible 4-bit values, rendering the code symmetrical within the series of 16 values
- 2207/49185 . . . Using biquinary code, i.e. combination of 5-valued and 2-valued digits, having values 0, 1, 2, 3, 4 and 0, 5 or 0, 2, 4, 6, 8 and 0, 1 respectively
- 2207/4919 . . . Using excess-3 code, i.e. natural BCD + offset of 3, rendering the code symmetrical within the series of 16 possible 4 bit values
- 2207/49195 . . . Using pure decimal representation, e.g. 10-valued voltage signal, 1-out-of-10 code
- 2207/492 . . . Indexing scheme relating to groups  
[G06F 7/492](#) - [G06F 7/496](#)
- 2207/4921 . . . Single digit adding or subtracting
- 2207/4922 . . . Multi-operand adding or subtracting
- 2207/4923 . . . Incrementer or decrements
- 2207/4924 . . . Digit-parallel adding or subtracting
- 2207/506 . . . Indexing scheme relating to groups  
[G06F 7/506](#) - [G06F 7/508](#)
- 2207/5063 . . . 2-input gates, i.e. only using 2-input logical gates, e.g. binary carry look-ahead, e.g. Kogge-Stone or Ladner-Fischer adder
- 2207/535 . . . Indexing scheme relating to groups  
[G06F 7/535](#) - [G06F 7/5375](#)
- 2207/5351 . . . Multiplicative non-restoring division, e.g. SRT, using multiplication in quotient selection
- 2207/5352 . . . Non-restoring division not covered by  
[G06F 7/5375](#)
- 2207/5353 . . . Restoring division
- 2207/5354 . . . Using table lookup, e.g. for digit selection in division by digit recurrence
- 2207/5355 . . . Using iterative approximation not using digit recurrence, e.g. Newton Raphson or Goldschmidt
- 2207/5356 . . . Via reciprocal, i.e. calculate reciprocal only, or calculate reciprocal first and then the quotient from the reciprocal and the numerator
- 2207/544 . . . Indexing scheme relating to group [G06F 7/544](#)
- 2207/5442 . . . Absolute difference
- 2207/552 . . . Indexing scheme relating to groups  
[G06F 7/552](#) - [G06F 7/5525](#)
- 2207/5521 . . . Inverse root of a number or a function, e.g. the reciprocal of a Pythagorean sum
- 2207/5523 . . . Calculates a power, e.g. the square, of a number or a function, e.g. polynomials
- 2207/5525 . . . Pythagorean sum, i.e. the square root of a sum of squares
- 2207/5526 . . . Roots or inverse roots of single operands
- 2207/5528 . . . . Non-restoring calculation, where each result digit is either negative, zero or positive, e.g. SRT
- 2207/556 . . . Indexing scheme relating to group [G06F 7/556](#)
- 2207/5561 . . . Exponentiation by multiplication, i.e. calculating  $Y^{**}INT(X)$  by multiplying Y with itself or a power of itself, INT(X) being the integer part of X
- 2207/58 . . . Indexing scheme relating to groups  
[G06F 7/58](#) - [G06F 7/588](#)

2207/581	. . Generating an LFSR sequence, e.g. an m-sequence; sequence may be generated without LFSR, e.g. using Galois Field arithmetic	2209/483	. . Multiproc
2207/582	. . Parallel finite field implementation, i.e. at least partially parallel implementation of finite field arithmetic, generating several new bits or trits per step, e.g. using a GF multiplier	2209/484	. . Precedence
2207/583	. . Serial finite field implementation, i.e. serial implementation of finite field arithmetic, generating one new bit or trit per step, e.g. using an LFSR or several independent LFSRs; also includes PRNGs with parallel operation between LFSR and outputs	2209/485	. . Resource constraint
2207/72	. Indexing scheme relating to groups <a href="#">G06F 7/72</a> - <a href="#">G06F 7/729</a>	2209/486	. . Scheduler internals
2207/7204	. . Prime number generation or prime number testing	2209/50	. Indexing scheme relating to <a href="#">G06F 9/50</a>
2207/7209	. . Calculation via subfield, i.e. the subfield being GF(q) with q a prime power, e.g. GF((2**m)**n) via GF(2**m)	2209/501	. . Performance criteria
2207/7214	. . Calculation via prime subfield, i.e. the subfield being GF(p) with p an integer prime > 3; e.g. GF(p**k) via GF(p)	2209/5011	. . Pool
2207/7219	. . Countermeasures against side channel or fault attacks	2209/5012	. . Processor sets
2207/7223	. . . Randomisation as countermeasure against side channel attacks	2209/5013	. . Request control
2207/7228	. . . . Random curve mapping, e.g. mapping to an isomorphous or projective curve	2209/5014	. . Reservation
2207/7233	. . . . Masking, e.g. (A**e)+r mod n	2209/5015	. . Service provider selection
2207/7238	. . . . . Operand masking, i.e. message blinding, e.g. (A+r)**e mod n; k.(P+R)	2209/5016	. . Session
2207/7242	. . . . . Exponent masking, i.e. key masking, e.g. A**(e+r) mod n; (k+r).P	2209/5017	. . Task decomposition
2207/7247	. . . . . Modulo masking, e.g. A**e mod (n*r)	2209/5018	. . Thread allocation
2207/7252	. . . . of operation order, e.g. starting to treat the exponent at a random place, or in a randomly chosen direction	2209/5019	. . Workload prediction
2207/7257	. . . . Random modification not requiring correction	2209/502	. . Proximity
2207/7261	. . . Uniform execution, e.g. avoiding jumps, or using formulae with the same power profile	2209/5021	. . Priority
2207/7266	. . . Hardware adaptation, e.g. dual rail logic; calculate add and double simultaneously	2209/5022	. . Workload threshold
2207/7271	. . . Fault verification, e.g. comparing two values which should be the same, unless a computational fault occurred	2209/503	. . Resource availability
2207/7276	. . Additional details of aspects covered by group <a href="#">G06F 7/723</a>	2209/504	. . Resource capping
2207/728	. . . using repeated square-and-multiply, i.e. right-to-left binary exponentiation	2209/505	. . Clust
2207/7285	. . . using the window method, i.e. left-to-right k-ary exponentiation	2209/506	. . Constraint
2207/729	. . . . Sliding-window exponentiation	2209/507	. . Low-level
2207/7295	. . . using an addition chain, or an addition-subtraction chain	2209/508	. . Monitor
2209/00	<b>Indexing scheme relating to <a href="#">G06F 9/00</a></b>	2209/509	. . Offload
2209/46	. Indexing scheme relating to <a href="#">G06F 9/46</a>	2209/52	. Indexing scheme relating to <a href="#">G06F 9/52</a>
2209/461	. . Bridge	2209/521	. . Atomic
2209/462	. . Lookup	2209/522	. . Manager
2209/463	. . Naming	2209/523	. . Mode
2209/48	. Indexing scheme relating to <a href="#">G06F 9/48</a>	2209/54	. Indexing scheme relating to <a href="#">G06F 9/54</a>
2209/481	. . Exception handling	2209/541	. . Client-server
2209/482	. . Application	2209/542	. . Intercept
		2209/543	. . Local
		2209/544	. . Remote
		2209/545	. . Gui
		2209/546	. . Xcast
		2209/547	. . Messaging middleware
		2209/548	. . Queue
		2209/549	. . Remote execution
		2211/00	<b>Indexing scheme relating to details of data-processing equipment not covered by groups <a href="#">G06F 3/00</a> - <a href="#">G06F 13/00</a></b>
		2211/001	. In-Line Device
		2211/002	. Bus
		2211/003	. Mutual Authentication Bi-Directional Authentication, Dialogue, Handshake
		2211/004	. Notarisation, Time-Stamp, Date-Stamp
		2211/005	. Network, LAN, Remote Access, Distributed System
		2211/006	. . E-Mail
		2211/007	. Encryption, En-/decode, En-/decipher, En-/decypher, Scramble, (De-)compress
		2211/008	. . Public Key, Asymmetric Key, Asymmetric Encryption
		2211/009	. Trust
		2211/10	. Indexing scheme relating to <a href="#">G06F 11/10</a>
		2211/1002	. . Indexing scheme relating to <a href="#">G06F 11/1076</a>
		2211/1004	. . . Adaptive RAID, i.e. RAID system adapts to changing circumstances, e.g. RAID1 becomes RAID5 as disks fill up
		2211/1007	. . . Addressing errors, i.e. silent errors in RAID, e.g. sector slipping and addressing errors

- 2211/1009 . . . Cache, i.e. caches used in RAID system with parity
- 2211/1011 . . . Clustered RAID, i.e. clustered or de-clustered RAID where data and parity are spread over more disks than blocks in a parity group
- 2211/1014 . . . Compression, i.e. RAID systems with parity using compression techniques
- 2211/1016 . . . Continuous RAID, i.e. RAID system that allows streaming or continuous media, e.g. VOD
- 2211/1019 . . . Fast writes, i.e. signaling the host that a write is done before data is written to disk
- 2211/1021 . . . Different size blocks, i.e. mapping of blocks of different size in RAID systems with parity
- 2211/1023 . . . Different size disks, i.e. non uniform size of disks in RAID systems with parity
- 2211/1026 . . . Different size groups, i.e. non uniform size of groups in RAID systems with parity
- 2211/1028 . . . Distributed, i.e. distributed RAID systems with parity
- 2211/103 . . . Hybrid, i.e. RAID systems with parity comprising a mix of RAID types
- 2211/1033 . . . Inactive data in parity groups, i.e. RAID parity groups where parity is calculated on only occupied or busy bits in the stripe
- 2211/1035 . . . Keeping track, i.e. keeping track of data and parity changes
- 2211/1038 . . . LFS, i.e. Log Structured File System used in RAID systems with parity
- 2211/104 . . . Metadata, i.e. metadata associated with RAID systems with parity
- 2211/1042 . . . NanoRAID, i.e. RAID systems using nanotechnology
- 2211/1045 . . . Nested RAID, i.e. implementing a RAID scheme in another RAID scheme
- 2211/1047 . . . No striping, i.e. parity calculation on a RAID involving no stripes, where a stripe is an independent set of data
- 2211/105 . . . On the fly coding, e.g. using XOR accumulators
- 2211/1052 . . . RAID padding, i.e. completing a redundancy group with dummy data
- 2211/1054 . . . Parity-fast hardware, i.e. dedicated fast hardware for RAID systems with parity
- 2211/1057 . . . Parity-multiple bits-RAID6, i.e. RAID 6 implementations
- 2211/1059 . . . Parity-single bit-RAID5, i.e. RAID 5 implementations
- 2211/1061 . . . Parity-single bit-RAID4, i.e. RAID 4 implementations
- 2211/1064 . . . Parity-single bit-RAID3, i.e. RAID 3 implementations
- 2211/1066 . . . Parity-small-writes, i.e. improved small or partial write techniques in RAID systems
- 2211/1069 . . . Phantom write, i.e. write were nothing is actually written on the disk of a RAID system
- 2211/1071 . . . Power loss, i.e. interrupted writes due to power loss in a RAID system
- 2211/1073 . . . Problems due to wear-out failures in RAID systems
- 2211/1076 . . . RAIP, i.e. RAID on platters
- 2211/1078 . . . RAIR, i.e. RAID on removable media
- 2211/108 . . . RAIT, i.e. RAID on tape drive
- 2211/1083 . . . Reserve area on a disk of a RAID system
- 2211/1085 . . . RMW, i.e. Read-Modify-Write method for RAID systems
- 2211/1088 . . . Scrubbing in RAID systems with parity
- 2211/109 . . . Sector level checksum or ECC, i.e. sector or stripe level checksum or ECC in addition to the RAID parity calculation
- 2211/1092 . . . Single disk raid, i.e. RAID with parity on a single disk
- 2211/1095 . . . Writes number reduction, i.e. reducing the number of writes in a RAID array with parity
- 2211/1097 . . . Boot, Start, Initialise, Power
- 2211/902 . . . Spectral purity improvement for digital function generators by adding a dither signal, e.g. noise
- 2212/00 Indexing scheme relating to accessing, addressing or allocation within memory systems or architectures**
  - 2212/10 . . . Providing a specific technical effect
  - 2212/1004 . . . Compatibility, e.g. with legacy hardware
  - 2212/1008 . . . Correctness of operation, e.g. memory ordering
  - 2212/1012 . . . Design facilitation
  - 2212/1016 . . . Performance improvement
  - 2212/1021 . . . Hit rate improvement
  - 2212/1024 . . . Latency reduction
  - 2212/1028 . . . Power efficiency
  - 2212/1032 . . . Reliability improvement, data loss prevention, degraded operation etc
  - 2212/1036 . . . Life time enhancement
  - 2212/1041 . . . Resource optimization
  - 2212/1044 . . . Space efficiency improvement
  - 2212/1048 . . . Scalability
  - 2212/1052 . . . Security improvement
  - 2212/1056 . . . Simplification
  - 2212/15 . . . Use in a specific computing environment
  - 2212/151 . . . Emulated environment, e.g. virtual machine
  - 2212/152 . . . Virtualized environment, e.g. logically partitioned system
  - 2212/154 . . . Networked environment
  - 2212/16 . . . General purpose computing application
  - 2212/161 . . . Portable computer, e.g. notebook
  - 2212/163 . . . Server or database system
  - 2212/165 . . . Mainframe system
  - 2212/17 . . . Embedded application
  - 2212/171 . . . Portable consumer electronics, e.g. mobile phone
  - 2212/172 . . . Non-portable consumer electronics
  - 2212/1721 . . . Home entertainment system, e.g. television set
  - 2212/173 . . . Vehicle or other transportation
  - 2212/174 . . . Telecommunications system
  - 2212/175 . . . Industrial control system
  - 2212/177 . . . Smart card
  - 2212/178 . . . Electronic token or RFID
  - 2212/20 . . . Employing a main memory using a specific memory technology
  - 2212/202 . . . Non-volatile memory
  - 2212/2022 . . . Flash memory
  - 2212/2024 . . . Rewritable memory not requiring erasing, e.g. resistive or ferroelectric RAM
  - 2212/2028 . . . Battery-backed RAM
  - 2212/205 . . . Hybrid memory, e.g. using both volatile and non-volatile memory
  - 2212/206 . . . Memory mapped I/O
  - 2212/21 . . . Employing a record carrier using a specific recording technology

2212/211	. . Optical disk storage	2212/403	. . Error protection encoding, e.g. using parity or ECC codes
2212/2112	. . . with a removable carrier, e.g. DVD	2212/45	. Caching of specific data in cache memory
2212/213	. . Tape storage	2212/451	. . Stack data
2212/214	. . Solid state disk	2212/452	. . Instruction code
2212/2142	. . . using write-once memory, e.g. OTPROM	2212/453	. . Microcode or microprogram
2212/2146	. . . being detachable, e.g.. USB memory	2212/454	. . Vector or matrix data
2212/217	. . Hybrid disk, e.g. using both magnetic and solid state storage devices	2212/455	. . Image or video data
2212/22	. Employing cache memory using specific memory technology	2212/46	. Caching storage objects of specific type in disk cache
2212/221	. . Static RAM	2212/461	. . Sector or disk block
2212/222	. . Non-volatile memory	2212/462	. . Track or segment
2212/2228	. . . Battery-backed RAM	2212/463	. . File
2212/224	. . Disk storage	2212/464	. . Multimedia object, e.g. image, video
2212/225	. . Hybrid cache memory, e.g. having both volatile and non-volatile portions	2212/465	. . Structured object, e.g. database record
2212/25	. Using a specific main memory architecture	2212/466	. . Metadata, control data
2212/251	. . Local memory within processor subsystem	2212/468	. . The specific object being partially cached
2212/2515	. . . being configurable for different purposes, e.g. as cache or non-cache memory	2212/50	. Control mechanisms for virtual memory, cache or TLB
2212/253	. . Centralized memory	2212/502	. . using adaptive policy
2212/2532	. . . comprising a plurality of modules	2212/507	. . using speculative control
2212/254	. . Distributed memory	2212/60	. Details of cache memory
2212/2542	. . . Non-uniform memory access [NUMA] architecture	2212/601	. . Reconfiguration of cache memory
2212/26	. Using a specific storage system architecture	2212/6012	. . . of operating mode, e.g. cache mode or local memory mode
2212/261	. . Storage comprising a plurality of storage devices	2212/602	. . Details relating to cache prefetching
2212/262	. . . configured as RAID	2212/6022	. . Using a prefetch buffer or dedicated prefetch cache
2212/263	. . Network storage, e.g. SAN or NAS	2212/6024	. . History based prefetching
2212/264	. . Remote server	2212/6026	. . Prefetching based on access pattern detection, e.g. stride based prefetch
2212/27	. Using a specific cache architecture	2212/6028	. . Prefetching based on hints or prefetch instructions
2212/271	. . Non-uniform cache access [NUCA] architecture	2212/603	. . of operating mode, e.g. cache mode or local memory mode
2212/272	. . Cache only memory architecture [COMA]	2212/6032	. . Way prediction in set-associative cache
2212/28	. Using a specific disk cache architecture	2212/604	. . Details relating to cache allocation
2212/281	. . Single cache	2212/6042	. . Allocation of cache space to multiple users or processors
2212/282	. . Partitioned cache	2212/6046	. . . Using a specific cache allocation policy other than replacement policy
2212/283	. . Plural cache memories	2212/608	. . Details relating to cache mapping
2212/284	. . . being distributed	2212/6082	. . . Way prediction in set-associative cache
2212/285	. . Redundant cache memory	2212/62	. Details of cache specific to multiprocessor cache arrangements
2212/286	. . . Mirrored cache memory	2212/621	. . Coherency control relating to peripheral accessing, e.g. from DMA or I/O device
2212/30	. Providing cache or TLB in specific location of a processing system	2212/622	. . State-only directory, i.e. not recording identity of sharing or owning nodes
2212/301	. . In special purpose processing node, e.g. vector processor	2212/65	. Details of virtual memory and virtual address translation
2212/302	. . In image processor or graphics adapter	2212/651	. . Multi-level translation tables
2212/303	. . In peripheral interface, e.g. I/O adapter or channel	2212/652	. . Page size control
2212/3035	. . In peripheral device, e.g. printer	2212/653	. . Page colouring
2212/304	. . In main memory subsystem	2212/654	. . Look-ahead translation
2212/3042	. . . being part of a memory device, e.g. cache DRAM	2212/655	. . Same page detection
2212/305	. . being part of a memory device, e.g. cache DRAM	2212/656	. . Address space sharing
2212/306	. . In system interconnect, e.g. between two buses	2212/657	. . Virtual address space management
2212/31	. Providing disk cache in a specific location of a storage system	2212/68	. Details of translation look-aside buffer [TLB]
2212/311	. . In host system	2212/681	. . Multi-level TLB, e.g. microTLB and main TLB
2212/312	. . In storage controller	2212/682	. . Multiprocessor TLB consistency
2212/313	. . In storage device	2212/683	. . Invalidation
2212/314	. . In storage network, e.g. network attached cache	2212/684	. . TLB miss handling
2212/40	. Specific encoding of data in memory or cache		
2212/401	. . Compressed data		
2212/402	. . Encrypted data		



- 2212/70 . Details relating to dynamic memory management
- 2212/702 . . Conservative garbage collection
- 2212/72 . Details relating to flash memory management
- 2212/7201 . . Logical to physical mapping or translation of blocks or pages
- 2212/7202 . . Allocation control and policies
- 2212/7203 . . Temporary buffering, e.g. using volatile buffer or dedicated buffer blocks
- 2212/7204 . . Capacity control, e.g. partitioning, end-of-life degradation
- 2212/7205 . . Cleaning, compaction, garbage collection, erase control
- 2212/7206 . . Reconfiguration of flash memory system
- 2212/7207 . . management of metadata or control data
- 2212/7208 . . Multiple device management, e.g. distributing data over multiple flash devices
- 2212/7209 . . Validity control, e.g. using flags, time stamps or sequence numbers
- 2212/7211 . . Wear leveling
- 2213/00 Indexing scheme relating to interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units**
- 2213/0002 . Serial port, e.g. RS232C
- 2213/0004 . Parallel ports, e.g. centronics
- 2213/0006 . Extension to the industry standard architecture [EISA]
- 2213/0008 . High speed serial bus, e.g. Fiber channel
- 2213/0012 . High speed serial bus, e.g. IEEE P1394
- 2213/0014 . Futurebus
- 2213/0016 . Inter-integrated circuit (I2C)
- 2213/0018 . Industry standard architecture [ISA]
- 2213/0022 . Multibus
- 2213/0024 . Peripheral component interconnect [PCI]
- 2213/0026 . PCI express
- 2213/0028 . Serial attached SCSI [SAS]
- 2213/0032 . Serial ATA [SATA]
- 2213/0034 . Sun microsystems bus [SBUS]
- 2213/0036 . Small computer system interface [SCSI]
- 2213/0038 . System on Chip
- 2213/0042 . Universal serial bus [USB]
- 2213/0044 . Versatile modular eurobus [VME]
- 2213/0052 . Assignment of addresses or identifiers to the modules of a bus system
- 2213/0054 . Split transaction bus
- 2213/0056 . Use of address and non-data lines as data lines for specific data transfers to temporarily enlarge the data bus and increase information transfer rate
- 2213/0058 . Bus-related hardware virtualisation
- 2213/0062 . Bandwidth consumption reduction during transfers
- 2213/0064 . Latency reduction in handling transfers
- 2213/16 . Memory access
- 2213/1602 . . Memory access type
- 2213/24 . Interrupt
- 2213/2402 . . Avoidance of interrupt starvation
- 2213/2404 . . Generation of an interrupt or a group of interrupts after a predetermined number of interrupts
- 2213/2406 . . Generation of an interrupt or a group of interrupts after a fixed or calculated time elapses
- 2213/2408 . . Reducing the frequency of interrupts generated from peripheral to a CPU
- 2213/2412 . . Dispatching of interrupt load among interrupt handlers in processor system or interrupt controller
- 2213/2414 . . Routing of interrupt among interrupt handlers in processor system or interrupt controller
- 2213/2416 . . Determination of the interrupt source among a plurality of incoming interrupts
- 2213/2418 . . Signal interruptions by means of a message
- 2213/2422 . . Sharing of interrupt line among a plurality of interrupt sources
- 2213/2424 . . Interrupt packet, e.g. event
- 2213/28 . DMA
- 2213/2802 . . DMA using DMA transfer descriptors
- 2213/2804 . . Systems and methods for controlling the DMA frequency on an access bus
- 2213/2806 . . Space or buffer allocation for DMA transfers
- 2213/2808 . . Very long instruction word DMA
- 2213/36 . Arbitration
- 2213/3602 . . Coding information on a single line
- 2213/3604 . . Coding information on multiple lines
- 2213/38 . Universal adapter
- 2213/3802 . . Harddisk connected to a computer port
- 2213/3804 . . Memory card connected to a computer port directly or by means of a reader/writer
- 2213/3806 . . Mobile device
- 2213/3808 . . Network interface controller
- 2213/3812 . . USB port controller
- 2213/3814 . . Wireless link with a computer system port
- 2213/3852 . . Converter between protocols
- 2213/3854 . . Control is performed at the peripheral side
- 2213/40 . Bus coupling
- 2213/4002 . . Universal serial bus hub with a single upstream port
- 2213/4004 . . Universal serial bus hub with a plurality of upstream ports
- 2216/00 Indexing scheme relating to additional aspects of information retrieval not explicitly covered by [G06F 16/00](#) and subgroups**
- 2216/01 . Automatic library building
- 2216/03 . Data mining
- 2216/05 . Energy-efficient information retrieval
- 2216/07 . Guided tours
- 2216/09 . Obsolescence
- 2216/11 . Patent retrieval
- 2216/13 . Prefetching
- 2216/15 . Synchronised browsing
- 2216/17 . Web printing
- 2219/00 Indexing scheme relating to application aspects of data processing equipment or methods**
- 2219/10 . Environmental application, e.g. waste reduction, pollution control, compliance with environmental legislation
- 2221/00 Indexing scheme relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity**
- 2221/03 . Indexing scheme relating to [G06F 21/50](#), monitoring users, programs or devices to maintain the integrity of platforms
- 2221/031 . . Protect user input by software means
- 2221/032 . . Protect output to user by software means
- 2221/033 . . Test or assess software

- 2221/034 . . Test or assess a computer or a system
- 2221/07 . . Indexing scheme relating to [G06F 21/10](#), protecting distributed programs or content
- 2221/0702 . . Binding
- 2221/0704 . . . Device
- 2221/0706 . . . . Domain
- 2221/0708 . . . Location
- 2221/0711 . . . Token
- 2221/0713 . . . User
- 2221/0715 . . . . Characteristics
- 2221/0717 . . . . Domain
- 2221/072 . . . . Knowledge
- 2221/0722 . . Content
- 2221/0724 . . . Editing
- 2221/0726 . . . Personalisation
- 2221/0728 . . . . Conversion
- 2221/0731 . . . . On user or administrative requirements
- 2221/0733 . . . . Watermark
- 2221/0735 . . . Restriction at operating system level
- 2221/0737 . . . Traceability
- 2221/074 . . . . Tracing pattern recognition
- 2221/0742 . . . Enhanced product
- 2221/0744 . . . Unique instance ([G06F 2221/0702 takes precedence](#))
- 2221/0746 . . Emerging technologies
- 2221/0748 . . Hiding
- 2221/0751 . . Key
- 2221/0753 . . . Distribution
- 2221/0755 . . . Generation
- 2221/0757 . . Licence
- 2221/0759 . . . Conversion
- 2221/0762 . . . Definition
- 2221/0764 . . . . Grace period
- 2221/0766 . . . . Language
- 2221/0768 . . . Editing
- 2221/0771 . . . Revocation
- 2221/0773 . . . Recurrent authorisation
- 2221/0775 . . Logging
- 2221/0777 . . Return
- 2221/0779 . . Transfer
- 2221/0782 . . . Backup or restore
- 2221/0784 . . . Fragments
- 2221/0786 . . . Indirect via third party
- 2221/0788 . . . Peer-to-Peer [P2P]
- 2221/0791 . . . Superdistribution
- 2221/0793 . . . Synchronisation
- 2221/0795 . . . Transaction with ACID [Atomicity, Consistency, Isolation and Durability] properties
- 2221/0797 . . using dedicated hardware at the client
- 2221/21 . . Indexing scheme relating to [G06F 21/00](#) and subgroups addressing additional information or applications relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity
- 2221/2101 . . Auditing as a secondary aspect
- 2221/2103 . . Challenge-response
- 2221/2105 . . Dual mode as a secondary aspect
- 2221/2107 . . File encryption
- 2221/2109 . . Game systems
- 2221/2111 . . Location-sensitive, e.g. geographical location, GPS
- 2221/2113 . . Multi-level security, e.g. mandatory access control
- 2221/2115 . . Third party
- 2221/2117 . . User registration
- 2221/2119 . . Authenticating web pages, e.g. with suspicious links
- 2221/2121 . . Chip on media, e.g. a disk or tape with a chip embedded in its case
- 2221/2123 . . Dummy operation
- 2221/2125 . . Just-in-time application of countermeasures, e.g., on-the-fly decryption, just-in-time obfuscation or de-obfuscation
- 2221/2127 . . Bluffing
- 2221/2129 . . Authenticate client device independently of the user
- 2221/2131 . . Lost password, e.g. recovery of lost or forgotten passwords
- 2221/2133 . . Verifying human interaction, e.g., Captcha
- 2221/2135 . . Metering
- 2221/2137 . . Time limited access, e.g. to a computer or data
- 2221/2139 . . Recurrent verification
- 2221/2141 . . Access rights, e.g. capability lists, access control lists, access tables, access matrices
- 2221/2143 . . Clearing memory, e.g. to prevent the data from being stolen
- 2221/2145 . . Inheriting rights or properties, e.g., propagation of permissions or restrictions within a hierarchy
- 2221/2147 . . Locking files
- 2221/2149 . . Restricted operating environment
- 2221/2151 . . Time stamp
- 2221/2153 . . Using hardware token as a secondary aspect