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Post Paper Notes

1. Multimedia container format
   → A metafile
   → that contains audio and video

→ File compression can be done when either one of ↓ exists

2. Spatial redundancy - is when a sequence of consecutive pixels in the same frame have the same value.

   Temporal redundancy - is when a pixel in the same location in two consecutive frames has the same value

3. communication systems that support the transmission over WWW
   → cell phone network
   → Satellite system
   → Public switched telephone network

4. Network hardware used in a LAN
   → Copper cables / fibre optic cables.
   → Server, Router, Gateway, Hub, switch, repeater

5. Methods of verifying transmitted data
   → Check sum
   → Parity check
   → Echo check
   → ARQ

6. Security measures to protect web server
   → Firewall
   → Proxy server
   → Authentication

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7. Program Counter
→ points to the address of the next instruction to be fetched
→ so the address can be sent to the MAR

MAR
→ points to the address (where data) to be fetched
→ so data can be transferred to MDR

MDR
→ Holds the data recieved from MAR
→ so data can be transmitted to the CIR

CIR
→ Holds the data recieved from MDR
→ it stores the current instruction being processed

8. The executable file does not contain the library routines
A DLL file can be edited without having to recompile the calling Program
One drawback of DLL file is that the main program could stop working if the DLL file is corrupted

★ DLL = Dynamic Link Library ★

9. Interpreter
→ Converts high level language code into low level code
→ Translates and runs one line at a time
→ Stops when an error occurs
→ allows errors to be corrected in real time.

10. Compiler
→ Converts highlevel language to low level code
→ Translates whole program before attempting to run it
→ Creates an executable file
→ if errors found, generates a report of all errors in the end.

11. reason to copyright
→ legal recognition of ownership
→ legal restrictions on use of the program.

12. File compression (utility program)
→ Reduces file size by using algorithms to change the data.
→ it can be lossy or lossless

13. Defragmenter (utility program)
→ finds files that are split across the disk and moves the blocks that make up each file to be contiguous.
→ Collates free space.

14. validation for DB
→ Presence Check
→ Length Check

15. Layout and operation of a magnetic hard disk drive
→ the disk has one or more platters
→ the platters are coated w ferrous oxide, which is capable of being magnetised.
→ the platters are mounted on a central spindle
→ the disks are rotated at high speed.
→ Each surface of the disk has a read-write head mounted on an arm positioned just above the surface.
→ The data is encoded as a magnetic pattern for each block

16. Definition of sampling
→ amplitude of sound wave taken at different points in time.
→ measurement of value of analogue signal at regular time intervals

17. Five modes of addressing

→ Direct: The operand is the address of the value to be used.

→ Indirect: The operand is the address of the address of the value to be used.

→ Immediate: The operand is the value to be used

→ Indexed: The operand plus contents of index register is the address of the value to be used

→ Relative: The operand is offset from the current address where the value to be used is stored.

18. Definition of sampling resolution
→ Sampling resolution is number bits used to store each sample. The higher the sampling resolution the smaller the quantization error. Usually 8 bit, 16 bit, 24 bit, 32 bit.

19. Benefit of high sampling rate
→ Crisper sound quality
→ allows larger dynamic ranges

20. Drawback of high sampling rates
→ occupies more space
→ it takes longer to transmit / download.

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21. Router - A device that transfers data from one network to other in an intelligent way. It has the task of forwarding data packets to their destination by the most efficient route.

22. A device used between 2 dissimilar LAN's. The device converts data packets from one protocol to another - GATEWAY

23. Server - A device or software that provides a specific function for computers using a network. The most common example handle printing, file storage and delivery of web pages.

24. Methods of preventing accidental loss of data
→ maintain daily backup
→ disk mirroring strategy
→ Backup generator, UPS

25. width of data bus
→ more width, more data can be transmitted
→ improves processing speed

26. Clock speed
→ determines the number of cycles CPU can execute in unit time
→ increasing clock speed increases no. of cycles.
→ it causes a lot of heating, so it cannot be increased a lot.

27. Benefits of USB ports
→ devices are automatically detected
→ it is nearly impossible to wrongly connect a device.
→ USB has become industrial standard
→ Supported by many OS
→ USB 3.0 allows full duplex data transfer.

28. Table is not in 1NF
→ table has repeated group of attributes

29. Table is not in 3NF
→ There is a non-key dependency. and partial dependency.

30. Pixel - A single square of one colour
- Smallest addressable element in an image.

31. Tasks performed by Operating System
→ memory management
→ file management
→ security management
→ hardware resources management
→ input/output management

32. Features of peer to peer network
→ all computers are of equal status
→ Computers can communicate and share resources
→ Each computer is responsible for its own safety.

33. Drawbacks of peer to peer network
→ Reduced security
→ No central management of backup
→ No central management of files
→ individual computers may respond slower.

34. Benefits of wired connection
→ Faster connection
→ More reliable/stable connection
→ More secure

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35. Benefits of wireless connection
→ Freedom of movement
→ No need of a physical connection
→ Less cabling

36. Uses of program libraries
→ Program libraries store pre-written functions and routines
→ Program library can be refrenced.
→ the functions can be called in their own code.

37. ~~Interpreter~~

37. Data integrity
→ ensure data is consistent.
→ Examples: Validation rules, Referential integrity, verification
↳ things to be done to maintain data integrity

38. ALU - arithmetic and logical operations

39. Control Unit - sends recieves signals, synchronises operations, controls operations

40. Status Register - it is interpreted as independent flags, Each flag is set depending on an event.
ex. addition overflow.

41. Features of graphics softwares used to edit photos.
→ Resize - increase / decrease the size of the image
→ Crop - remove part of the image
→ Blur - reduce the focus
→ Red eye reduction - Reduces red (light reflected from human eyes)

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42. Internal working of resistive screen
→ consists of 2 charged plates
→ Pressure causes plates to touch, completing the circuit
→ Point of contact registered
→ Coordinates used to calculate the position

43. Internal working of capacitive screen
→ made from materials that store electric charge
→ when touched charge is transferred to the finger
→ sensors at screen corners detect the change
→ Point of contact registered
→ Coordinates used to calculate the position.

44. Features of bitmapped graphics
→ Add text
→ Colour select → select all pixels of the same colour
→ Resize shapes to fit in given area
→ Fill an area with colour
→ Copy → replicate a number of pixels.

45. Calculation
→ image is 160 pixels high and 160 pixels wide and colour depth of 3 bytes per pixel

$160 \times 160 = 25600$ pixels
$25600 \times 3 = 76800$ bytes
$\frac{76800}{1000} = 76.8$ KB

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46. Benefits of creating vector graphic instead of bitmapped
→ Image can be enlarged without getting pixelated, because the instructions to create the logo are stored.
→ Usually smaller file size because only coordinates and calculations stored instead of individual pixels.

47. Use of utility softwares
→ Backup
→ The files on the hard disk can be corrupted / lost
→ So a copy of the files can be stored somewhere else so images can be restored.

→ Defragmenter
→ Frequent changes to the files mean the data for each file is split across the disk
→ So defragmenter is used to rearrange the fragmented files into contiguous locations
→ This improves the time it takes to access and load the files.

→ Disk repair
→ Areas of the disk can become corrupt, so to identify the errors to repair them.

48. File header (things stored) in a bitmap file.
→ Vertical height in pixels
→ Horizontal width in pixels
→ Bit depth
→ File size in bytes
→ Type of compression used.
→ image resolution
→ Image size

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49. Calculation

Image is 512 pixels by 256 pixels, calculate file size in kB

$$\frac{512 \times 256}{8 \times 1024} = 16KB$$

50. Utility Programs

→ ~~Backup~~
→ Virus checker
→ File compression
→ Back up software
→ Firewall

51. Difference between Bitmap and Vector Graphic

→ Bitmap is made up of pixels // VG stores a set of instructions
→ BM files are bigger in size compared to VG
→ Enlarging BM makes the image pixelated // VG doesnt get pixelated
→ BM can be compressed // VG cannot be compressed well
→ BM suitable for pics // VG suitable for geometric ~~shag~~ shapes
→ BM use less processing power // VG use more.

52. Frame rate - Frames per second.

53. Interlaced encoding

→ The data from a single frame are encoded as 2 different fields
→ One containing the data for the even numbered rows/lines and other has data for odd numbered rows/lines.
→ The viewer sees data from 2 frames simultaneously.
→ the field rate is 2wice the frame rate.
→ Produces what appears to the eye to be a high refresh rate.
→ Halves the transmission bandwidth requirements.

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54. Progressive Encoding
→ stores data for an entire frame
→ field rate = frame rate
→ High bandwidth requirements

55. Components of speaker
→ Diaphragm → Basket
→ coil of wire → Dust cap
→ suspension → Outer frame
→ Magnet

56. How does microphone capture sound
→ The microphone has a diaphragm
→ incoming sound ~~ways~~ waves cause vibrations
→ causing a coil to move past a magnet
→ An electric current is generated.

57. Increasing sampling reso - larger file size, more accurate, less quantization
decreasing sampling reso - smaller file size, less accurate, more quantization

58. Features in a sound editing software.
→ Cut/delete
→ Copy and Paste
→ Amplify

59. 60 fps means → 60 images are recorded per second.

60. multimedia container format → contains various diff types of data

61. if you want to remove pixels crop the pic

62. if you want to use fewer bits per pixel then use fewer colours

63. Events that can generate an interrupt in F-E cycle

→ Hardware fault

→ I/O request

→ Program/software error

→ End of a time-slice

64. How interrupts are handled during F-E cycle.

→ At the end of each F-E cycle the processor checks for interrupts

→ Check if an interrupt flag is set

→ Processor identifies source of interrupt

→ Processor checks priority of interrupt

→ if priority is high, then content of current registers is saved.

→ Processor calls interrupt handler.

→ When service of interrupt is complete, processor restores registers

65. Library routine

→ Pre-written modules, can be linked to programs, to perform common tasks

→ Benefit → Less code to be written / saves time

→ Pre-tested

→ simplifies the program / can perform complex calc.

→ Drawback → Compatibility issues

→ Not guaranteed thorough testing

→ It may not meet exact needs.

66. Applications that can use the client server model

→ sending and receiving mail

→ Company or school centrally storing files

→ Using a print server

→ Using a file server

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67. Process management [OS]
→ Manages the scheduling of processes
→ Manages which resources the processes require
→ Enables processes to share information
→ Prevents interference between processes.

68. Memory Management (OS)
→ Allocates memory to processes
→ Ensures fair usage of memory
→ Organises memory
→ makes use of virtual memory
→ releases memory when a process stops

69. How sound sampling is used by the mobile phone to encode the sound
→ The amplitude of the wave is measured at regular time intervals
→ The value is stored as a binary number.

70. What is a drawing object
→ An individual shape

71. Properties of drawing object
→ Line colour → Shape
→ Line width → Outline style
→ Fill colour → Dimentions/ size
→ Position

72. Describe how RLE can be used to compress a single video frame
→ Frame is made up of pixels
→ Each pixel has a binary value for its colour
→ Consecutive pixels with the same value are stored as a single data value and a count.

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73. Methods to compress a single video frame
→ RLE
→ Reduce colour depth
→ Reduce image resolution.

74. Adv of HDD
→ less expensive
→ more storage capacity

75. Adv of SSD
→ No moving parts
→ Low Latency / Fast read write time.

76. increasing sampling rate will increase accuracy and reduce quantization erro.

77. Screen Resolution - The number of pixels which can be viewed horizontally and vertically on the screen
- ex. 1680 pixels x 1080 pixels

78. Example of
→ Main memory manggement = user closes any program

79. Sequence of the display of web page on the computer screen.
→ URL entered into web browser
→ browser parses URL to obtain domain name
→ browser passes domain name to the nearest DNS
→ DNS stores a list of names and matching IP addresses
→ If Domain name not found, it is forwarded to high level DNS
→ The og DNS adds domain name to cache
→ The og DNS returns IP address to the originator
→ browser uses the IP address to request the required web page from the web server
→ web server retrieves the page and delivers
→ browser interprets the script and displays web page

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80. properties of an object / shape
→ Line width
→ Fill colour
→ Line colour
→ Line style

81. what is meant by drawing list
→ A list that stores each seperate object in the image
→ Each shape has its own drawing list
→ example. Three triangles, one square, one circle.

82. security implementations to stop unauthorised access
→ Passwords
→ Firewall
→ Biometrics
→ Two step. authentication.

81. maximum number of op codes that can be represented using eight bits. 256

82. condition flags that can be set in status register
→ zero → sign / negative
→ carry → Compare results
→ Overflow → Parity.

83. Referential Integrity
The FK in the table should have a corresponding value in the PK of the main table

84. items that can be made using DDL
→ Table → Indexes → PK → Relationships
→ Fields → Users → FK → Views

85. Difference between public and private IP

→ Private IP is known only within the LAN // Public is known outside the LAN

→ Private IP is more secure than Public

→ Private IP is allocated by router // Public is allocated by ISP

86. Device management (OS)

→ Install device drivers

→ Device detection

→ Power management

→ keep track of device status (free or busy)

→ Buffer management.

87. Error detection and recovery management (OS)

→ Deals with interrupts

→ Deal with hardware faults

→ Error diagnostic messages

→ Deals with runtime errors generated by software.

88. Drawback of compiler

→ program will not run if there are any errors

→ errors cannot be corrected in real time

→ part-programs cannot be tested.

→ one error may result in other false errors being reported.

89. Domain name and IP address

→ Ex. of Domain name - cambridgeinternational.org

→ Ex. of IP address - 198.162.2.1

→ Each domain is linked to an IP

→ DNS is required to convert the domain name to IP

→ IP can access server directly

→ Domain name needs to be converted to access server.

90. Peripheral Management (OS)
→ Installation of device driver software
→ Control of buffers
→ Management of queues.

91. How a vector graphic is represented by a computer
→ Contains a drawing list
→ Commands for creating each individual object
→ stored coordinates
→ it is a series of geometric shapes / lines / objects.

92. Why code of conduct is required
→ To identify what employees can do
→ To identify what employees cannot do
→ To identify the consequences of employees performing activities they should not
→ To identify company's values
→ To identify what behaviours can be measured against

93. The maximum range for 8 bit two's complement is -128 to +127.

94. http://cie.org.uk/computerscience.html
↓ protocol ↓ domain name ↓ file name

95. URL contains characters %20 and ?
%20 - because <space> not allowed in URL, %20 is the coding for a space.

? - separates the URL from parameters or variables.

96.

BL	BL	BL	RD	RD	RD		BL	BL	BL	RD	RD	RD
K	K	K	K	K	K		BL	BL	BL	RD	RD	RD
LG	LG	LG	DG	DG	DG		LG	LG	LG	DG	DG	DG
Y	Y	K	Y	Y	K		BK	BK	BK	BK	BK	BK
W	K	W	W	W	DG		W	K	W	W	W	DG
P	P	P	P	P	P		P	P	P	P	P	P
Frame 1							Frame 2					

How does Temporal redundancy work?

→ if a pixel in frame 2 has the same value in frame 1 on the same location then the pixel need not be sent again.

→ Ex. Row 1, 3, 5 and 6 are exactly the same so only Row 2 and 4 need to be resent.

97. Benefits of client-server model

→ centralised back-up

→ file and resources are centralised

→ clients can be less powerful machines ∴ less expensive to buy

→ internet monitoring.

98. Validation and Verification

→ Validation - check whether data entered meets the criteria → does not check if data is correct

→ Verification - check entered data against original document - does not check data is acceptable.

99. 8 bits are required to store each pixel for a 256-colour bitmap. Each colour is represented by one of 256 values.

100. The media used by storage devices

→ Hard Disk - magnetic storage media

→ DVD-RW - optical storage media

→ Flash memory - solid state memory device

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101. MP3 format
→ it is a lossy compression
→ uses psycho-acoustic modelling
→ removes sounds humans cant hear
→ discards softer sounds if two sounds played together.

102. Stored program concept for the basic Von Neumann model.
→ program must be in main memory to be executed.
→ program consists of a sequence of instructions.
→ instructions and data are indistinguishable
→ each instruction is fetched, decoded then executed.

103. SRAM has faster access time
SRAM has more complex circuitry → constructed from flip flops
SRAM is used as cache memory

104. DRAM is less expensive to manufacture
DRAM needs to be refreshed
DRAM is constructed from capacitors, that leak electricity.

105. IP v4
→ seperated by dots/ full stops
→ Numbers between 0 - 255
→ stored in 32 bits or 4 bytes
→ hexadecimal and Decimal.

106. IP v6
→ seperated by colons
→ Numbers between 0 and FFFF
→ stored in 128 bits or 16 bytes
→ only hexadecimal

107. Control bus - transmits signals between CU and other components

108. Data bus - Carries data between the processor and memory

109. Increasing bus width of data bus from 16 bits to 32 bits increases the number of directly addressed memory locations from 2^{16} to 2^{32}.

110. Provision of user interface (OS)
- → allows user to communicate with hardware
- → provides facility for user inputting data
- → provides facility for outputting to user
- → ex. GUI.

111. Virus Checker (Utility)
- → scans files on computer system for malicious code.
- → sets up a schedule for virus-checking
- → quarantines/deletes virus
- → regularly updates the virus definitions.

112. Backup software (Utility)
- → Creates a copy of contents of the disk
- → takes automatic ~~updates~~ backups / scheduled
- → user can decide what should be backed up
- → may encrypt the backup files.
- → Restores the data if necessary

113. Examples of applications that can use Client-server model
- → Sending and receiving mail
- → A company centrally storing files
- → Using a print server
- → Using a file server.

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114. Practical application of BCD
→ Any scenario when a single digit needs to be transmitted
→ ex. calculator / digital clock.

115. ASCII
→ Each character is represented by a unique denary number

116. Security → prevents loss of data
Privacy → prevents unauthorised access.

117. difference between tebibyte and terabyte
tebibyte → 1024 gibibyte
terabyte → 1000 gigabyte.

118. SRAM uses transistors arranged as → flip flops
DRAM uses transistors and capacitors

119. Why is ____ an embedded system.
→ The ____ is built into / integrated into something
→ The ____ performs only one specific task.
→ The ____ cannot be easily changed / updated

120. Encryption
→ data is turned into cipher text
→ it is used so that data cannot be understood if it is intercepted, without the decryption key.

121. Types of instruction groups
→ Data movement group
→ Arithmetic operations → add sub
→ Compare instructions → compare the result to another value
→ Input and Output of data → Takes input from user.
→ Unconditional and conditional Jumps → JPE JPN.

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122. Why data might not be correct even after validating and verifying
→ Validation checks if data meets requirement it does not check accuracy of data.
→ Verification checks if data matches original data, it does not check if original data is accurate.

123. Cloud ~~Comp~~ Computing
→ Accessing a service / file on a remote server.

124. Benefits of cloud computing
→ Can be accessed anywhere with internet connection.
→ No need to buy specific hardware / software
→ Can easily share documents
→ Can have multiple people working on the same document.

125. Drawbacks of cloud computing
→ You cannot access it if no internet
→ You cannot access it if server goes down
→ Reliant on someone else for security.

126. Client side scripting
→ web page may have interactive features
→ Ex. text box, buttons
→ Validates the input client side

127. Server side scripting
→ Database on the server is accessed
→ Searches for the data user entered
→ Returns something