object.ICT

**Processes:** Data collection → organization → storage → processing → analysis → transmission → presentation

* Data logging - Keep track of data
* Accuracy checking - check for correct data
* Data categorization - Sort, group, order

**Information Sys specialists:**

* Sys analyst - Research, planning & implementation
* Programmer - Sys design to code
* Technician - Backup IS
* Network Manager - monitor Sys performance
* Data entry operator - entering info

**Info age:** Access info anywhere anytime with low cost, info literate, lifelong learning

* ASCII - each character (1 byte)
* GB for simplified (2 byte)
* Big5 for traditional (2 byte)
* Unicode - any language (1-4 byte)

**Data input error:**

* Data source error - Input incorrect
* Transcription error - oO il
* Transposition error - 12 21

Field presence check </>

Field length check <--->

Range check <1...2>

Fixed value check <M/F>

Format check <@gmail.com>

type check <str>

Check digit <parity check>

| Overflow: 01 + 01 = 10 (none) 11 + 01 = 100 (overflow)

| Odd: 11100000 3 x 1: odd matches odd ∴ parity bit = 0

| Even: 11100000 3 x 1: odd not even ∴ party bit = 1

| // add a “1” to match the even requirement

| Sent odd: 11100000 3 x 1: odd matches odd = error-free

| Sent even: 11100000 3 x 1: odd not even = error

**Two’s compliment:** Invert & add one. (current 4 bit memory unit)

* -2 🡪 0010 (2) 🡪 1101 🡪 1110 (-2)

**Data Hierarchy:** field - record - table - database

**Color depths:**

* 2^1 colors (bit:1) - black & white
* 2^8 colors (bit:8) - monochromatic
* 2^24 colors (bit:24) - RGB (true color)

[/F] Size/ppi | size/dpi

[/F] vector graphics - independent of resolution & color depth, simple line arts & charts

Analogue data - can’t be stored

Digital data - can be stored

[/F] Quantization - sample data > digital code with predefined scale

[/F] Sampling - Store analogue data sample

**Office automation:**

^ Productivity

+ data management

+ communication

V company expense by saving storage space

[/F] Data application, storage, exchange, management - edit, produce / report doc, modify digital image

[/F] People & equipment are the main factors affecting effectiveness of office automation

[/F] Work processor - create edit save print text doc

**Word processor features:**

* Left center right aligned / Full justified
* First-line / L / R indentation
* Thesaurus
* Mail merge
* Spelling & Grammar checker
* AutoCorrect
* Themes
* Styles

**Advantages for word processor:**

* Document saved in digital form
* Create doc faster with features
* Features like autocorrect increases accuracy

/F] Spreadsheet software - allow users to input & organize data, create charts & perform data analysis

object.Excel\_functions

|  |  |
| --- | --- |
| **Expression** | Info |
| =A1 | Get cell val A1 |
| =$A$1 | Get the absolute cell val A1, copying doesn't affect it |
| =Name!... | Get cell val from Sheet with <Name> |
| ="Yes"A1 | Get cell val A1 with string "Yes" in front |

|  |  |  |
| --- | --- | --- |
| **Functions** | **Input** | Info |
| Min | range | Get min val |
| Max | range | Get max val |
| Large | range, int | Get the intᵗʰ max val |
| Small | range, int | Get the intᵗʰ min val |
| Average | range | Get average val |
| Count | range | Count cells in selection range |
| Countif | range, criteria | Count cells with criteria |
| Mode | range | Get cell val with highest occurance |
| Sum | range | Get sum val of range |
| Sumif | checkrange, criteria, range | Get sum val of range which checkrange meets criteria |
| Int | cell | Get rounded val of cell with 0 d.p. (as integer) |
| Round | cell, int | Get rounded val of cell with int d.p. (supports -int) |
| Mod | cell, float | Get remainder of cell ÷ divider |
| Power | cell, float | Get val of cellᶠˡᵒᵃᵗ |
| If | criteria, valtrue, valfalse | If criteria met, show as valtrue, else valfalse |
| & | criteria1, criteriaN | If criterias met, show TRUE, else FALSE |
| Code | cell | Returns a numeric code for the first character |
| Len | cell | Returns the number of characters |
| Left | int | Returns int characters from the LEFT |
| Right | int | Returns int characters from the RIGHT |
| Mid | int1 int2 | Returns int2 characters from the int1 character |
| XLOOKUP | cell lookup\_array return\_array | The XLOOKUP function searches a range or an array, & then returns the item corresponding to the first match it finds. If no match exists, then XLOOKUP can return the closest (approximate) match. |
|  |  |  |

**Guideline of chart type selection:**

* Column/bar chart: Compare data in categories
* Line chart: Display the trend overtime
* Pie chart: Compare percentage of categories
* Scatter chart: Show association between data series
* Stock chart: Show trend of stock price

**Cell formatting:**

* General: 020.05
* Currency: US$20.05
* Number: 20.05
* Fraction: 20 1/20

**Autofill:**

* Source.cell=1 or str≠time/data 🡪 fills up with same value
* Source.cell>1 & str/number=patterned 🡪 extends the series

[/F] Sorting is a process of reordering the records according to a specific criterion

[/F] Filtering is a function to select & display the records meeting the criteria specified by a user, hiding the other records

[/F] Scenario Manager allow users to create different scenarios & compare the results by switching between them

[/F] Goal seek works reversely to evaluate the values of cells concerned from a given conclusion

**Pivot table guide: (Ref P.1-280)**

|  |  |
| --- | --- |
| **Filters** | **Columns** |
| Use filters to filter out certain value of certain groups | Stuff to display on top of table |
| **Rows** | **Values** |
| Stuff to display on the left  When things are stacked up, the topper item becomes the group of the bottom items | Values to display in the table  Types can be:   * Sum * Count * Average / Max / Min |
| **Example:**  | House |  | Student ID | | **Output:**  [-] <House>  10223  [-] <House2>  32321  39211 |

[/F] A database is a collection of data related to a particular topic or purpose

**DBMS - Microsoft Access**

|  |  |
| --- | --- |
| **Field** | Specified by field name, data type & field length |
| **Key field** | Unique to a specific record |
| **Input mask** | Prevent user from inputting invalid data |
| **Datasheet view** | Display a table organized in rows & columns |
| **Design view** | Display underlying structure of a table |
| **Forms** | Graphical UI used to edit & display data |
| **Reports** | Print data in a professional & easy-to-read layout |

**Data types:**

* Text: Short text
* Memo: Long text
* Number: Numbers for calculation
* Date/time: Date / time
* AutoNumber: Unique number assigned when create new record (Auto)
* Yes / No: Store bools
* Hyperlink: Hyperlinks

**Query Commands:**

|  |  |
| --- | --- |
| **SELECT** | fields(s) - target fields to be used as results |
| **FROM** | table(s) |
| **WHERE** | condition - the condition of a field in the same row  WHERE column=’value’; WHERE column>1; |
| **ORDER BY** | field(s) |
| **ASC / DESC** | Order by ascending or descending |
| **;** | Marks the end of the command |

**Integrating Data**

* **Data import**
* **Object linking & Embedding** (OLE)
  + **Object linking**
    - Create linked obj that links to an actual obj
    - Obj not saved in doc
    - Syncs with the actual obj
    - Less change in file size
  + **Object embedding**
    - Copying the obj to the destination doc
    - Obj saved in doc
    - Not syncing with actual obj
    - Bigger change in file size

[/F] Software suite is a group of apps designed to work together

[/F] Mail merge (from DB) / MSEquation / Charts (from Excel) [OLE Obj]

**Presentation of information**

* Graphical presentation attract audience & convey message by means of symbols
* Multimedia presentation help deliver info effectively & attractively
* **Processes to create presentation**
  + Planning

Deciding the objective, content, form & means of presentation

* + Collecting & selecting info
  + Organizing info
  + Introducing interactive elements
  + Conduction
* **Introduction**

Explain main obj of presentation

* **Body**

Explain key points clearly one by one

Keep explanations simple & short

* **Conclusion**

Short conclusion to re-emphasize the key points

QNA sections can be included after finished

* **Storyboards**

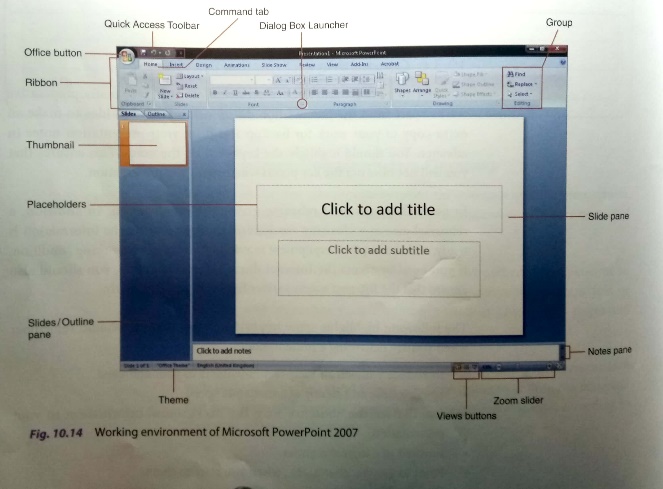
Description of the storyboard template

Color, slide template, typeface, font configuration, spacing

Sequence of slides that show the layout of where each element is located

Text, slides, multimedia

* **Interactive elements**

Button, hyperlink, rollover button, textbox, checkbox, dropdown menu

**CPU**

* Components: ALU Arithmetic & logic unit, CU control unit, registers
* **ALU**

Performs logical operations

* **CU**

Keeps track of the sequence of instructions being processed

* **Registers**

Registers are memory units inside CPU providing storage space for ALU CU

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GPRs generate purpose registers:

1. Accumulator AX
2. Base register BX
3. Counter CX
4. Data register DX

Functions

* + - Add AX, AX: Double the value of AX
    - Add AX, 1: Add 1 to AX (LOAD)
    - Sub AX, AX: Set AX to 0
    - Sub AX, 1: Minus 1 from AX (CMP)
    - Div AX, AX: Set AX to 1
    - Div AX, 1: Divide AX by 1

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Status register

* + - Zero sign: “0”:”1”?”0”
    - Sign flag: “<0”:”1”?”0”

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Control registers

* Instruction register | Instructions to execute by CPU
* Program counter | Memory address of next instruction
* MAR memory address register | Address of memory location to / from data to be transferred
* MDR memory data register | Data to be written into / read from the location

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* **Sys bus**

Physical wiring that connects the components of computer Sys

64-bit data bus 🡪 transmit 64 bits data at a time

Computer processor bit = data bus bit

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1. Data bus | Transfer **data** & **instructions**
2. Address bus | Transfer **source** **address** or **destination** **address** of data
3. Control bus | Indicate direction of data transfer & coordinate the timing

| of data transfer

**Machine cycle**

Process of executing an instruction in CPU

1. Fetch | Read next instruction from memory to IR
2. Decode | Identify operation code & oper&s
3. Execute | Perform required operation
4. Interrupts | Check for & h&les interrupts, CPU saves process status & h&les

| interrupt, then resume operation of next instruction

**Measure CPU speed**

* **CPU speed calculation**

1 Hz = 1 clock cycle / sec

Time taken to complete operation =

Time taken for running program =

* **Word length**

Number of bits of data & instructions the CPU can h&le at one time

**Main memory**

Store data & instructions that the CPU will execute

* **RAM**

Temporarily holds data & instructions of apps & OS

* + **Volatile**: data stored disappears after depowered
  + access speed > hard disk
* **ROM**

Stores permanent information

* + **Non-volatile**: data stored does not disappear after depowered
  + Includes bootstrap program & BIOS basic input/output Sys
* **Flashy Memory**

Data can be read and written at high speeds.

* + RAM: can’t be rewritten (flash: non-volatile)
  + ROM: contents can’t be changed (flash: rewritable)
* **Cache Memory**

High-speed memory storing data & instructions used recently by CPU

**Input devices**

* Keyboards
* **Pointing Devices**

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Mechanical Mouse | Ball on underside & tracks it’s rolling direction

Optical Mouse | Optical senser on underside & detects movement

* LED: can’t operate on smooth surfaces
* Laser: can operate on smooth surfaces

Trackballs | Roll the ball with finger to operate

* Stationary
* Saves space

Touchpads | Drag fingertip on the touchpad to operate

* Found on notebook computers

Track Points | Users move the pointer in the direction it’s pushed

* Found on notebook computers

Joysticks | A vertical lever to operate

Touch Screens | Interact with computer by pressing & dragging on screen

* Used in info kiosks in airports, libraries & shopping center
* Uses more energy to run
* Is both an Input & Output device

Digitizing Tablets | Graphic tablets, draw & sketch on computer

* Engineering & graphic designing

H&writing Boards | Works with a pen-like stylus

* Uses pressure sensitive board to sense strokes
* Designed for Chinese character input
* Must work with character recognition software

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* **Scanners**

Used with OCR to convert text to editable file

Properties:

Sharpness of image scanned depends on resolution (dpi)

Color accuracy of image scanned depends on Color Depth

Accuracy of image scanned depends on the accuracy of the scanner

* **Optical Readers**

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Bar code readers | Captures image of bar code translates to digital data

* Increase accuracy & efficiency of data entry (scan instantly)
* Expensive & can scan limited info
* Used in libraries

Optical mark readers | Recognizes specific h&written marks

* Easier to mark forms & answer sheets
* Used with optical mark recognition software (OMR)

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* **Microphones**

Speech recognition Sys:

1. Record speech with microphone
2. Translate sound waves to code
3. Analyze the codes with data in database & fetch words
4. Analyze possible sentences with grammar & dictionary, getting most possible sentence
5. Output text

* **Cameras**

They use light-sensitive processor chips

Contents are stored in the memory card

They have an LCD display which allows users to view the images immediately

* Digital camera
* Digital video camera
* Web cam

**Output devices**

* **Visual display units (VDU)**

Info displayed on the screen is intangible

Properties:

Resolution: number of pixels a monitor can display (>:larger\_working\_area)

Dot pitch: the vertical distance between pixels (<:sharper)

Contrast ratio: The measurement of difference in light intensity

(>:more\_color\_distinguished)

* **Speakers**

Connected to a sound card

Convert auto signals from computer to sound

* **Printers**

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Dot-matrix | Strike pins against an ink ribbon to leave dots on paper

* Slow, noisy
* Low-quality printouts (480 dpi)
* For printing multi-part forms

Inkjet | Sprays tiny ink drops onto paper

* Normal
* High-quality printouts (600-5760 dpi)

Laser | Use laser beam to produce electrostatic film on a drum

* Fast, quieter
* High-quality printouts (600-4800 dpi)
* Stores the whole image of the page before printing

Thermal | Selectively heating thermal paper

* Low-quality printouts
* Used in point-of-sale Syss

Plotters | Same as inkjet

* High-quality, large-format printouts
* For blueprints, maps & posters

Multifunction |

* Includes printer, scanner, fax, telephone
* Cheaper, takes up less space than each device

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* **Video projectors**

**Combined setups**

* **Point-of-sale Terminal (POS)**

Used in supermarkets & chain stores

Input: Keyboard & barcode reader (Octopus card, credit card, ATM, QR code readers)

Output: VDU, thermal printers (receipts)

* **Cheque Deposit Machine**

Automatic banking machine operating 24/7

Input: Keyboard, touchscreen, ATM card reader

Output: Touchscreen, speaker

* **Small office home office (SOHO)**

Saves space used

Input: Keyboard, multifunction printer, mouse

Output: VDU, multifunction printer

* **Conference Room**

Input: Presenter (control slides, laser pointer, volume control)

Output: Video projector

**Secondary storage devices**

Used to store data, OS, apps

Non-volatile

Properties:

Access time: The average time taken for the device to search & read data on storage

Data transfer rate: Amount of data can be transferred per second (KBps, MBps)

* **Reading & writing**

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1. CPU: issue read instruction 🡪 storage
2. Storage: load data 🡪 memory
3. Main memory: load data & continue execute
4. CPU: store data 🡪 memory
5. CPU: issue write instruction 🡪 storage
6. Main memory: write data 🡪 storage

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* **Magnetic devices**

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Floppy disks | Circular flexible plastic disc with magnetic coating

* Access mode: Direct
* Capacity: low (2MB)
* Price: cheap
* Transfer rate: low (500 Kbps)
* Fading device

Hard disks | Consists one or more platters similar to above

* Access mode: Direct
* Capacity: high
* Durability: high
* Transfer rate: high
* **Properties: Seek time, drive rotational speed**

Magnetic tapes | Magnetically coated strip of plastic on which data is stored

* Access mode: Sequential
* Capacity: high
* Price: low
* Transfer rate: low

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* **Optical devices**

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Compact Disc Read-Only Memory CD-ROM | Round plastic disc coated with metallic surface

* Access mode: Direct
* ROM: read-only, CD-R: write once, CD-RW: write multiple times
* Capacity: low (750MB)
* Transfer rate: varies (150KBps - 7.3MBps)
* Accessed via red-light laser tech

Digital Versatile Disc DVD | More advanced type of disc

* Access mode: Direct
* Capacity: high (17GB, for films) [Dual layer: double]
* Transfer rate: high (1.32 MBps)
* Accessed via red-light laser tech

HD DVD & Blue-ray Disc | Incompatible with DVDs

* Access mode: Direct
* Capacity: high (15GB - 25 GB) [Dual layer: double]
* Transfer rate: high
* Accessed via blue-violet laser tech

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* **Other devices**

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Magneto-optical Disks | Uses magnetic and optical methods to read write

* Capacity: high (9.1GB)
* Fading device

Memory Cards | Extends storage of devices

* Access mode: Direct
* Capacity: varies
* Small
* Light
* Quiet
* Low power consumption

USB flash drives |

* Capacity: varies (max ~8GB)
* Some have password protection / fingerprint security sys

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* **Network storage**

Accessed through networks (Internet / Ethernet)

Additional storage space / central storage

* Storage device directly attached to file server
* Storage system connected to network
* Store data in remote computers (internet drives)

**s**

* **s**

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* **s**

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s | s

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s | s

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s | s

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referenceMaterials

b bit Hz Hertz

B 8 bits kHz 1,000 Hertz

KB 1024 Bytes 210 MHz 1,000,000 Hertz

MB 10242 Bytes 220 GHz 1,000,000,000 Hertz

GB 10243 Bytes 230

TB 10244 Bytes 240

Colors Transparent Alpha Compression Scaling Animation

PNG 224 1 1 0 0 0

JPG 224 0 0 1 0 0

GIF 28 1 0 0 0 1

SVG 224 1 1 0 1 1

BMP 28 1 1 0 0 0

Styles Size Open Graphics Edit

PDF 1 Big Special 1 Hard

TXT 0 Smol Any 0 Easy

RTF 1 Smol Any 0 Easy

LIST OF CHARACTER ASCII …… Big 5 GB Unicoode