



1. [HKDSE ICT 1B, 2D 卷一、二丁](#)
2. [HKDSE/HKCEE bit-pattern 位元樣式](#)  
Binary: 7-segment display [mrszeto.net/CIT/7-segment.htm](https://mrszeto.net/CIT/7-segment.htm)
3. [HKDSE ICT Database 2A 卷二甲](#)



8 位元 二進制補碼 8-bit 2's complement

<https://youtu.be/hC3ltoQuGCg?list=PLQutejmQFO79GXrGv9F7ittSnmYfhZgrx>

	位元樣式 bit-pattern	10 進制	反碼 negation
最小 min	1000 0000 (80)	-128	0111 1111
最大 max	0111 1111 (7F)	+127	1000 0000
	1001 1100 (9C)	-100	0110 0011
	0110 0100 (64)	+100	1001 1011
-1	1111 1111 (FF)	-1	0000 0000

<https://mrszeto.net/home/javascript/n-bit-drag.htm>

4 位元 二進制補碼 4-bit 2's complement

	位元樣式 bit-pattern	10 進制	反碼 negation
最小 min	1000	-8	0111
最大 max	0111	+7	1000
	1011	-5	0100
	0101	+5	1010
-1	1111 (F)	-1	0000

上溢 overflow: max+1, min-1 (數值不能被表示 value cannot be represented)

ASCII(字母、數字、符號), 大五碼 BIG5 (繁體中文), 國標碼 GB (簡體), 統一碼(utf)  
ASCII(A-Z、0-9、symbols), BIG5(Traditional Chinese), GB(Simplified Chi), Unicode(utf)

<https://mrszeto.net/home/javascript/number-system.htm#unicode>

A M a m 一 丁 하나 (press **Alt-x**)

BIN(2), DEC(10), HEX(16), OCT(8)

Hex F (1111 <sub>2</sub> )	F	4-bit
ipv4	FF.FF.FF.FF	32-bit
ipv6	FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF	128-bit
Mac address 實體地址	FF.FF.FF.FF.FF.FF	48-bit

<https://mrszeto.net/home/javascript/dec2x.htm>

## TCP/IP

電腦 X 傳送一個檔案至電腦 Z。以下步驟描述數據如何傳輸。

1. 檔案\_\_\_被分拆成數據包
2. 數據包由電腦 X 送出。
3. 數據包\_\_\_通過不同的路由器，在互聯網上傳輸
4. 確定所有數據包完成傳輸。
5. 數據包\_\_\_在電腦 Z 重新組裝



Computer X sends a file to a computer Z. The following steps describe how data is transmitted.

1. The file \_\_\_ are broken into packets
2. The packets are sent out from X.
3. The packets \_\_\_ are transmitted through the Internet via different routes
4. The completion of the transmission of all the packets is ensured.
5. The packets \_\_\_ are reassembled at Z



2022

啟用防火牆 firewall 的原因。Reasons for using firewall

<ul style="list-style-type: none"><li>• 基於規則，允許或阻止數據包</li><li>• 過濾入侵者</li><li>• 阻止未經授權存取</li><li>• 防止黑客攻擊</li><li>• 防止間諜軟件 / 勒索軟件攻擊</li><li>• 防止資料洩露</li><li>• 記錄用戶活動</li></ul>	<ul style="list-style-type: none"><li>• Permit or block data packets based on security rules</li><li>• Filter intruders</li><li>• block unauthorized access</li><li>• prevent hacking</li><li>• prevent spyware/ransomware attack</li><li>• prevent information leakage</li><li>• log user activity</li></ul>
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functions of the firewall.

- 檢查網絡數據包、過濾內容、偵測及防禦入侵等功能。
- 過濾進出的數據包，容許或封鎖特定的網絡流量
- checking network data packets, filtering content, and detecting and defending against intrusions.
- Filter incoming and outgoing data packets / Allow or block specified network traffic

電子支付系統的保安：

轉數快 FPS, Tap & Go, PayMe, 八達通 Octopus, AlipayHK, WeChat Pay, BoC Pay, Apple Pay

- 保安權標
- SSL 加密、雙重身份驗證、生物特徵身份驗證、
- 通過短信 / 電子郵件的一次性密碼、one-time-password
- 智能卡、採用數碼證書 / PKI 使用私鑰驗證用戶身份



E-payment system security:

- Security token
- SSL encryption, two-factor authentication, biometric authentication,
- one-time password via SMS/email, smartcard,
- adopt digital certificates / use a private key to verify the user identity

2021

在圖書館使用無線網絡(而非有線網絡)的好處。

- 用戶可以在圖書館的任何地方使用網絡服務，不受有線連接的限制。
- 網絡連接的數量較為靈活。
- 只允許 WiFi 設備使用網絡服務。

Benefits of using a wireless network (instead of a wired network) in the library.

- Users can access network services anywhere in the library without the limitation of cable connection.
- The number of network connections can be flexible.
- Allows WiFi-only devices to access network services

使用 WiFi 的潛在問題。 potential problems of using WiFi

- 安全問題，例如竊聽
- 不穩定的連接
- Security issues such as eavesdropping
- Unstable connection

<https://www.actcorp.in/blog/common-challenges-and-limitations-wifi-networks>

2020

系統軟件(操作系統/工具軟件)	應用軟件(Apps)
通常以低階語言編寫	通常以高階語言編寫 例：C, Python, Java
與應用軟件的互動	與用戶互動 (服務對象 user) 例：銀行職員
操作電腦硬件(printer)的通用軟件	用於執行用戶特定任務(例 POS)的軟件
維護應用軟件的系統資源	在系統軟件提供的平台(win/ios/unix)上運作

System software (OS, utility software)	Application software (Apps)
usually written by low level languages	usually written by high level languages
maintain system resources for application software	run on the platform provided by system software
Interaction with application software	Interaction with users
general purpose software used for operating computer hardware	specific purpose software used by user to specific task

2018

網絡界面卡 NIC：安裝於每個工作站，管理通過網絡電纜傳送/接收的數據。	網絡電纜：是網絡介面卡和交換器之間的通訊連結	交換器 switch：用於管理多台工作站和伺服器之間的數據傳輸。
A NIC (network interface card) is installed in each workstation to manage the data sent and received through the network cables.	Network cables are the communication links between the NICs and switches.	Switches are used to manage the data transmission between the workstations and servers.



(a) 交換器 switch	(b) 路由器 router	(c) 數據機 modem
管理網絡上的數據傳輸，連接電腦成為 LAN	連接兩個不同的網絡	將來自互聯網的模擬信號，和來自電腦的數碼信號(0,1)互相轉換。
Controls data transmission between devices in a network Connects devices to form a LAN	connect 2 different networks	convert between the analog signals from the Internet and the digital signals from computers.

電腦網絡由眾多電腦與周邊設備交織而成，列舉它的好處。 <ul style="list-style-type: none"> <li>彼此互通資訊、共用硬件、共用軟件資源，不受地域局限。</li> </ul>	A computer network is an interconnection of computers and peripheral devices that are connected <ul style="list-style-type: none"> <li>to exchange information and share hardware and software resources, without worrying about geographic barriers.</li> </ul>
要把裝置連接到電腦網絡，需要一些網絡硬件 <ul style="list-style-type: none"> <li>網絡界面卡 NIC</li> <li>網絡連接裝置(例如：交換器)</li> <li>網絡電纜(例如：UTP、光纖)</li> <li>無線網絡接達點 AP</li> </ul>	Networking hardware needed for connecting devices to a computer network <ul style="list-style-type: none"> <li>Network Interface Card (NIC)</li> <li>Network connecting devices (e.g. switch)</li> <li>Network cables (e.g. utp, fibre)</li> <li>Wireless access point AP</li> </ul>

#### 「路由器」的功能 Function of a router

<ul style="list-style-type: none"> <li>連接不同的網絡。(例如：連接 LAN 和 LAN，連接 WAN 和 LAN)</li> <li>基於 IP 位址，將數據包轉發到目的地裝置。</li> </ul>	<ul style="list-style-type: none"> <li>A router connects different networks. (e.g. LAN and LAN, LAN and WAN)</li> <li>It forwards data packets to destination devices based on the IP Address.</li> </ul>
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#### 集中化儲存數據在[伺服器]中的優點 advantages of storing data in the centralised servers

<ul style="list-style-type: none"> <li>保持數據一致。(只有一個版本)</li> <li>節省本機數據儲存空間。</li> <li>用戶可共同協作，提高效率。</li> <li>檔案容易備份。</li> </ul>	<ul style="list-style-type: none"> <li>Maintains the consistency of data for multiple devices.</li> <li>save storage space in the local device.</li> <li>Users can collaborate to increase efficiency.</li> <li>Facilitate the backup process.</li> </ul>
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#### 無線傳輸媒體(wi-fi, Bluetooth)的好處。benefits of using wireless transmission media.

Wi-Fi :	支援高速數據傳輸速率 網絡覆蓋較廣	supports a high data transfer rate provides larger network coverage
藍牙： Bluetooth	耗電低 支援對等網絡連接	low power consumption supports P2P (peer-to-peer) network connection

引致數碼隔閡的重要因素。 significant factors that cause the digital divide.

家庭收入、教育、年齡(長者)、殘疾(肢體/視障)、地理位置(山區)、家庭規模、類型、性別、種族	Family income, education, age, disability, geographical location, household size and type, gender, racial
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收窄數碼隔閡的方法。 ways of narrowing the digital divide.

<ul style="list-style-type: none"> <li>改善接觸 ICT 硬件設備的機會</li> <li>改善接觸互聯網的機會</li> <li>改善獲取/學習 ICT 知識的機會</li> </ul>	<p>Improve the access to ICT equipment (hardware)</p> <p>Improve the access to the Internet</p> <p>Improve the access to ICT knowledge (learning)</p>
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使用串流傳輸技術，來現場直播課堂。 using streaming technology to broadcast lectures live.

好處 benefit	<ul style="list-style-type: none"> <li>視頻可以在客戶端上，即時播放，而無需下載整個視頻</li> <li>因為無須儲存整個的視頻，節省了儲存空間</li> </ul>	<ul style="list-style-type: none"> <li>Videos can be instantly played on clients without downloading the entire video.</li> <li>It saves storage space as there is no need to store the entire videos.</li> </ul>
限制 limitation	頻寬、下載速度、網絡流量、穩定的互聯網連接、客戶端數量、不支援 avi、視頻無法下載 供以後觀看	bandwidth, download speed, network traffic, stable Internet connection, number of clients, it does not support AVI, video cannot be downloaded for later watching

### 通訊協定 protocol

SMTP 簡單郵遞傳送協定 Simple Mail Transfer Protocol	傳送電子郵件至電郵伺服器	send emails to the email server
IMAP 網絡信息存取協定 Internet Message Access Protocol	<ul style="list-style-type: none"> <li>閱讀電郵</li> <li>必須有互聯網連接</li> <li>可讓電子郵件在多個裝置上同步，用戶亦可在伺服器上整理電子郵件。</li> </ul>	<ul style="list-style-type: none"> <li>read emails in the email server</li> <li>Internet connection is required</li> <li>emails can be synchronised across different devices, and organised in the server.</li> </ul>
POP3 郵局協定第三版 Post Office Protocol (v3)	閱讀電郵，如果已事先下載電子郵件，不需要互聯網連接。	Internet connection is not required if they are downloaded beforehand.

	木馬程式 Trojan	電腦病毒 viruses	蠕蟲 worms
依附其他程式 Attached to other programs	✓	✓	
自我複製 Self-replication		✓	✓
在電腦網絡自動傳播 Spread on network automatically			✓

生物特徵 認證方法 biometric authentication method:

人臉辨識 / 虹膜辨識 / 視網膜辨識 / 指紋和掌紋辨識 / 手指靜脈辨識 / 語音辨識 / 耳道聲波辨識	face recognition, iris / eye vein / retinal scan, hand geometry (fingerprint / palmprint), palm vein, voice recognition
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Validation 有效性校驗 / Verification 數據校驗 (GIGO, 垃圾輸入, 垃圾輸出)

<https://mrszeto.net/home/javascript/datactrl.htm>

1. 範圍檢查	Range Check (Reasonableness)	e.g. 0-100, 1-12, A-E
2. 類型檢查	Data Type Check (int/char)	e.g. abc, 123
3. 長度檢查	Length Check	e.g. 1A01, HKID:A123456(3)
4. 檢查數位	Check Digit	A123456(3), ISBN:962-001-006-X, VISA
5. 完整性/存在檢查	Completeness / Presence Check	(檢查有否輸入)
6. 一致性檢查	Consistency Check	e.g. 煤氣錶讀數: 1314, 9999
7. 唯一檢查 (獨一無二)	Uniqueness Check	e.g. 註冊編號
8. 控制(批次)總和	Control (Batch) Total	e.g. 每 10 張單據一批: \$3450, \$9500

PKI (A → B)

A 傳送文件給 B A sends a document to B	 加密 encrypt	 解密 decrypt
不可否認 non-repudiation	A's <b>private</b> key 私匙	A's <b>public</b> key 公匙
私隱 privacy	B's <b>public</b> key 公匙	B's <b>private</b> key 私匙

2017

更安全密碼

密碼長度:	密碼 (8 個或更多字符)
密碼內容:	符(a-z)、數字(0-9)和符號(@)的組合 不是字典中的單詞, 不容易猜到的密碼
客戶端:	期更改密碼

more secure password

Password length:	long password (8 or more characters)
Password content:	combination of characters, numbers and symbols not a word in dictionary, not easy-to-guess password
Client side:	regularly update the password

2016

感熱式打印機 Thermo printer

操作寧靜 / 體積較小 / 打印時間較短  
silent / small in size / shorter printing time



2024

RAM 與 SSD 的一個功能上的分別。

	RAM	SSD
易失性 volatility	易失 volatile	非易失 non-volatile
功能 function	主記憶體 primary storage	輔助記憶體 secondary storage
數據傳輸率 transfer rate	較高 higher	較低 lower
儲存空間 storage size	較小 smaller	較大 larger
CPU 直接存取 direct access	可以 yes	不 no
程序/數據 hold program/data	CPU 正在執行 currently being executed by CPU	須長期儲存 for permanent storage

虛擬私有網絡 VPN 的功能。 functions of the VPN.

加密數據包，確保資料的保密性， 隱藏 IP 位址，保護用戶的網上身份。	encrypting data packets to ensure confidentiality, hide IP addresses to protect users' online identities.
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虛擬私有網絡(VPN)，提高網絡安全。

<ul style="list-style-type: none"> <li>客戶端與 VPN 伺服器之間建立一個「隧道」來傳送加密數據。</li> <li>隱藏客戶的 IP 位址。</li> <li>使用 VPN 連接至內聯網，或進行遠程存取。</li> </ul>	<ul style="list-style-type: none"> <li>A "tunnel" is established between client and VPN server to transmit encrypted data.</li> <li>Hide user's IP address.</li> <li>Use VPN to connect to an Intranet / Access WAN via VPN / Remote access using VPN</li> </ul>
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代理伺服器 proxy 與 VPN 的分別。 Difference between Proxy and VPN

<ul style="list-style-type: none"> <li>客戶端 client 與 proxy 代理伺服器之間的連接，沒有加密。</li> </ul>	<ul style="list-style-type: none"> <li>The connection between the client and the proxy server is not encrypted.</li> </ul>
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商用軟件 Commercial s/w	共享軟件 Shareware	免費軟件 Freeware	開放源碼軟件 Open source s/w
<ul style="list-style-type: none"> <li>Microsoft Office</li> <li>Adobe Photoshop</li> </ul>	<ul style="list-style-type: none"> <li>WinZip</li> <li>Adblock</li> <li>Photopea</li> <li>Zoom</li> </ul> 	<ul style="list-style-type: none"> <li>瀏覽器 Browsers (e.g. MS Edge, Chrome)</li> <li>即時通訊軟件 Instant messaging (e.g. WhatsApp, Signal)</li> <li>Acrobat pdf reader</li> </ul>  	<ul style="list-style-type: none"> <li>Linux</li> <li>Firefox</li> <li>Open Office</li> <li>GIMP</li> <li>Android</li> </ul> 
			

種類	好處	風險
共享軟件	<ul style="list-style-type: none"> <li>• 軟件擁有人通常會 迅速地修正程式錯誤及增新功能</li> <li>• 在購買之前可試用該軟件</li> <li>• 軟件有經常更新/支援</li> </ul>	<ul style="list-style-type: none"> <li>• 試用期後，它不再是免費的，使用該軟件或會犯法</li> <li>• 一些高階功能只可在付費版使用</li> <li>• 在試用期後需要付費使用</li> <li>• 顯示彈出式廣告 (直至付費購買)</li> </ul>
開放源碼軟件	<ul style="list-style-type: none"> <li>• 免費使用軟件</li> <li>• 可檢視/修改源碼</li> </ul>	<ul style="list-style-type: none"> <li>• 通常沒有技術支援</li> </ul>
免費軟件	<ul style="list-style-type: none"> <li>• 免費使用軟件</li> <li>• 可自由複製及分發軟件</li> </ul>	<ul style="list-style-type: none"> <li>• 技術支援較少</li> </ul>
商業軟件	<ul style="list-style-type: none"> <li>• 經常更新及提供技術支援</li> <li>• 一般無廣告</li> </ul>	<ul style="list-style-type: none"> <li>• 價錢較高</li> <li>• 不能修改源碼</li> </ul>

	Advantages	Risks
Shareware	<ul style="list-style-type: none"> <li>• The software owner usually fixes program bugs and adds features quickly.</li> <li>• Try the software before purchasing it.</li> <li>• Frequent update/support is available.</li> </ul>	<ul style="list-style-type: none"> <li>• After the trial period, it is not free to use the software or it is illegal to use the software.</li> <li>• Some advanced functions are reserved for paid version only.</li> <li>• Need to pay after the trial period.</li> <li>• Pop-up ad will be shown (until you buy the software).</li> </ul>
Open source software	<ul style="list-style-type: none"> <li>• It is free to use the program.</li> <li>• Source code is available for viewing / modification.</li> </ul>	<ul style="list-style-type: none"> <li>• Usually there is no technical support.</li> </ul>
Freeware	<ul style="list-style-type: none"> <li>• Free to use</li> <li>• Can copy and redistribute the software freely</li> </ul>	<ul style="list-style-type: none"> <li>• Less technical support</li> </ul>
Commercial software	<ul style="list-style-type: none"> <li>• Frequent updates and technical support</li> <li>• Usually ads-free</li> </ul>	<ul style="list-style-type: none"> <li>• Higher cost</li> <li>• Cannot modify the code</li> </ul>

成批處理 vs 實時處理 Batch-processing vs Real-time processing