① Binary representation of Data

N Bits → 2^N Different Values

4 Bits Hex Digits → 0 1 2 3 4 5 6 7 8 9 A B C D E F

4C 4F 56 → Hexadecimal Notation

Encoding / Decoding

Bit Patterns

Computer Memory

ASCII 8 Bits / Character

UTF-8 8 Bits / Character → 1 Byte ex. "A" 41 "B" 42

16 Bits / Character → 2 Bytes

24 Bits / Character → 3 Bytes ex. "ก" E0 B8 81 "ข" E0 B8 82

32 Bits / Character → 4 Bytes

N-Bit Two's Complement → int range $-2^{(n-1)}$ to $2^{(n-1)}-1$

Sign bit

⊕ 0.... ≈ Base-2

⊖ 1.... 1) Base-2 2) Toggle all bits 3) Add 1

|-10| = 10 = 01010 → 10101 → +1 → 10110

N-Bit base 2 → int range 0 to 2^n-1

N-Bit Bias-K / Excess-K → int range -K to 2^n-1-K

3-bit Excess-4: 2 → 110 → 2+4 = 6

Pattern : X in Excess-K → X + K in base-2

IEEE 754 ┬ Single-Precision 32 Bits

Sign Bit | Fraction | Exponent (Excess 127)

1 | 8 | 23

└ Double-Precision 64 Bits

1 | 11 | 52 (Excess 1023)

1) Base-2

2) Pattern : $1.\text{****} \times 2^{n}$ (Fraction, Exponent)

0.34375 (Single-Precision)

$= 2^{-2} + 2^{-4} + 2^{-5}$

$= 0.01011_2$

$= +1.011_2 \times 2^{-2}$ Excess 127

0 | 01111101 | 011000...000 (23 bits)

Preparation

1. What is the "8-bit Two's Complement" bit pattern representing a decimal value of -15 ?

Ans : 11110001

|-15| = 15 = 00001111 → 11110000 → 11110001

2. Which ones are correct ?

(-K to 2^n-1-K) → ~~-128 to 127~~ -8 to 119

X • An 8-bit Excess-8 bit can represents an integer in the range of ~~-128 to 127~~

X • An Excess-K bit pattern uses ~~K~~ N bits to represent an integer

Ans : None of above

3. What is "ค" in UTF-8 ?

Ans: E0 B8 84

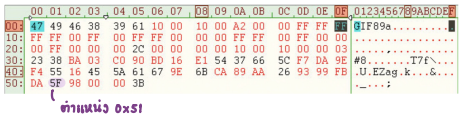
4. What is 0.171875 in IEE-754 32 bit Single-Precision Floating-Point Numbers ?

Ans : 0 0111 1100 011 0000 0000 0000 0000 0000

0.171875 = $2^{-3}+2^{-5}+2^{-6}$ = 0.001011 → $+1.011 \times 2^{-3}$ → -3+127 = 124 = 0111 1100

Activity

Part 1



ช่องละ 1 byte = 8 bit

Part 2

อ่านช่องหลัง → หน้า

color of pixel — RGB value (in HEX)

ex. FF FF FF (สีขาว)

Part 3 Hack Mario

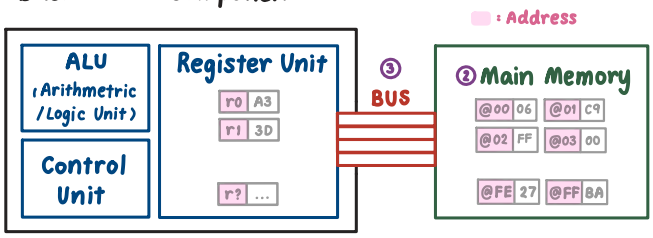
② Central Processing Unit (CPU)

Intel 8086 ดังมาก จุดเริ่มต้น instruction set ใช้จนถึงปัจจุบัน

CPU – หัวใจสำคัญ ประมวลผลข้อมูล
Main Memory (RAM) – หน่วยค.จำ เก็บโปรแกรม & ข้อมูลที่ใช้ในก.ประมวลผล
Motherboard – มี CPU & RAM & GPU อยู่บน สนับสนุนก.ทำงาน
Graphic Card (GPU) – ช่วยประมวลผลเฉพาะทาง Graphic AI
Hard Disk – หน่วยค.จำสำรอง เก็บข้อมูลไว้ตอนปิดเครื่อง / ไฟดับ
Power Supply – จ่ายกระแสไฟ

CPU – billions of transistors working synchronously in clock cycle
- ทำตามคำสั่ง machine language
- core = หน่วยประมวลผล
- CPU die (เนื้อ CPU บรรจุ transitors) pin (ขา เชื่อมต่ออุปกรณ์ภายนอก)

Basic CPU Components



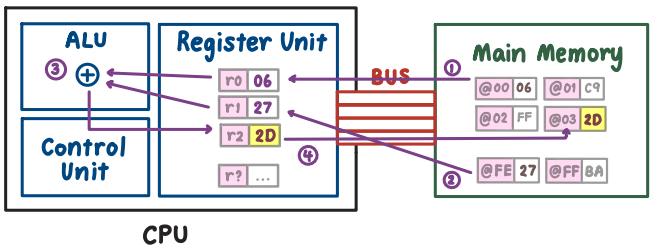
① CPU

ALU – ประมวลผลข้อมูล ≈ เครื่องคิดเลข
Control Unit – ควบคุม / กำหนดทิศทาง ก.ทำงาน
Register Unit – memory ใน CPU

Von Neumann Architecture

Load-Store Architecture – Data : RAM ⇌ registers ⇌ ALU

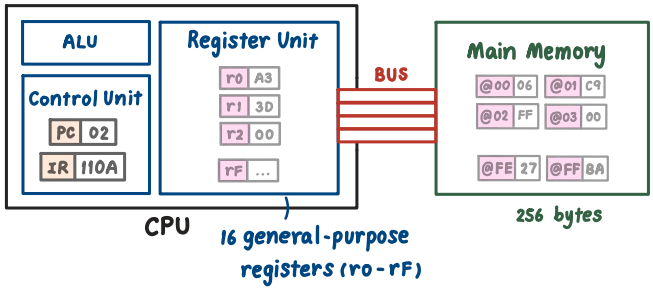
Adding 2 Numbers @03 ← @00 + @FE



CPU

CPU Execution

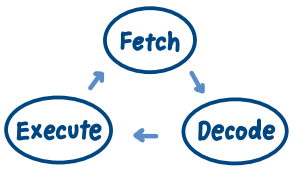
Brookshere's Simple Machine



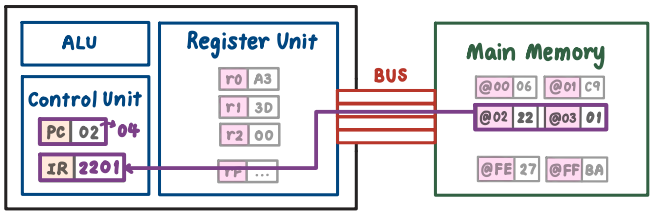
CPU
16 general-purpose registers (r0 - rF)
256 bytes

1 byte = 8 bits
Program Counter (PC) – เก็บตน.ของ memory ที่จะ execute
Instruction Register (IR) – เก็บคำสั่งที่กำลังประมวลผลอยู่
2 bytes = 16 bits

Machine Cycle



Fetch



Retrieve the next instruction RAM (indicated by PC) → IR, increment PC

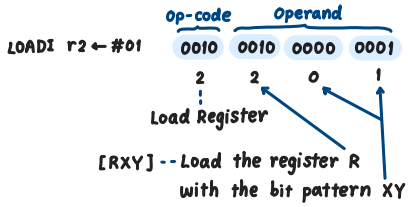
Decode – Decode bit pattern in IR

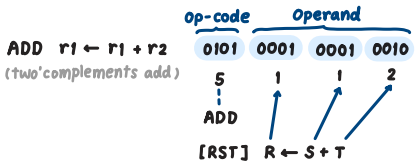
Instruction Types

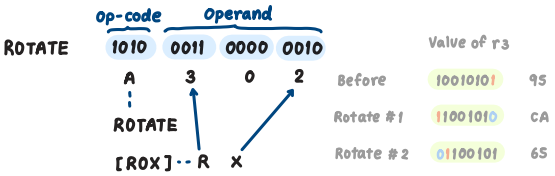
- **Data Transfer** – register ⇌ memory
  - constant (instruction → register)
  - register ⇌ register
- **Arithmetic / Logic** – Arithmetic operation (ADD int, float)
  - Boolean operation (AND, OR, XOR)
  - Bit-wise operation (ROTATE)
- **Control** – Conditional jumps/branches
  - HALT execution : หยุดก.ท่างาน

Parts of Instruction

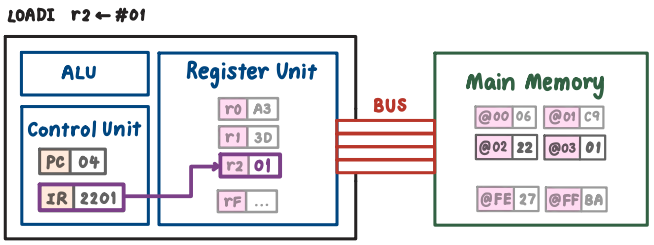
- **Op-code (Operation code) – 4 bits**
  - Specify the operation to execute
- **Operand – 12 bits**
  - Additional details about operation (Address, register, constant)

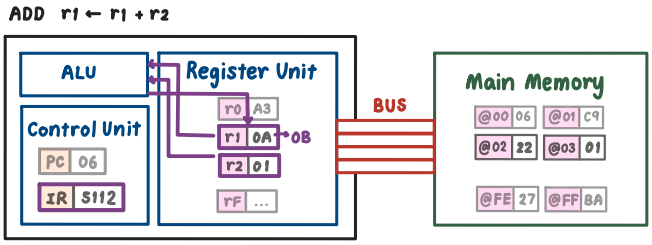






Execute – Perform action (instruction in IR)





Op-code	Operand	Description
1	RXY	LOAD R ← @XY
2	RXY	LOADI R ← #XY
3	RXY	STORE R → @XY
4	0RS	MOVE R ← S
5	RST	ADD R ← S+T (two's complement)
6	RST	ADD R ← S+T (floating-point)
7	RST	OR R ← S | T
8	RST	AND R ← S & T
9	RST	XOR R ← S ^ T
A	R0X	ROTATE R to the right X times.
B	RXY	JUMP XY IF (r0 == R)
C	000	HALT

JUMP r4, @3A

@20	B43A	JUMP r4,@3A
@22	5442	ADD r4,r4,r2
...	...	
@3A	C000	HALT

PC = 0x20

Case #1 : r0 = 0x1F , r4 = 0x1F equal
next : Fetch from RAM @3A

Case #2 : r0 = 0x1F , r4 = 0x32 not equal
next : Fetch from RAM @22

JUMP r0, @3A → always JUMP

Example : @0A ← @0A + 1

LOAD r1, @0A	@00 : 110A
LOADI r2, 0x01	@02 : 2201
ADD r1, r1, r2	@04 : 5112
STORE r1, @0A	@06 : 310A
HALT	@08 : C000
	@0A : 10

Preparation

1. Which CPU have significant impact on how CPU works today ?

   Ans : Intel 8086

2. For Brookshear Simple Machine, how many "Registers" are there?

   What is the capacity of the machine's main memory?

   Ans : 16 register, 2048 bits

3. Which operation provides the result of "01101001" ?

   - 11001110 AND 10110010 = 10000010
   - 11001110 OR 10110010 = 11111110
   - 11001110 XOR 10110010 = 01111100

   XOR

0	0	0
0	1	1
1	0	1
1	1	0

   Ans : None of the above

4. 11001011 AND X = Z
   (0-----01)

   Z OR 01011100 = 01011101
   (0-0---01)

   What is the value of X ?

   Ans : 00101001 , 01010001

5. What is the machine instruction that is corresponding to the following description?

   ADD the bit patterns in register 1 and 2 as though they were two's complement representations and leave the result in register 4.

   Ans : 0x5412

6. Which is the instruction of loading the bit pattern 0x21 into the register 6 ?

   Ans : 0x26 0x21

7. If value in memory at address 0x07 is 0x09, what should be the value in memory at address 0x06 if the instruction at address 0x06 is the instruction to XOR contents in register 0 and register 9 and store the result to register 1 ?

   Ans : 0x91

8. If we click button "Run" in Brookshear Emulator without doing anything, what will happen?

   Ans : Machine will fetch 1 instruction, decode, and complain illegal instruction

Activity

1. "2236", what does this perform ?

   Ans : LOAD the register 2 with the bit pattern 36

2. "8325", what does this perform ?

   Ans : AND the bit patterns in registers 5 and 2 and place the result in register 3

3. If you want to stop the execution which command should you use ?

   Ans : C000

4. "250F", what does this perform ?

   Ans : LOAD the register 5 with pattern 0F

5. | Address | Content |
   |---|---|
   | 26 | 11 |
   | 27 | 30 |
   | 28 | 20 |
   | 29 | 05 |
   | 2A | B1 |
   | 2B | 22 |
   | 2C | C0 |
   | 30 | 00 |
   | 31 | 04 |
   | 32 | FF |

   After instruction 1130 in @26-27,

   what valve loaded to register 1 ?

   Ans : 00

6. If register 0 valve is 04 and register 1 is 03 what will the instruction B12A result in?

   Ans : Nothing (the program will execute the instruction after B12A)

7. The instruction is 2031, what valve is loaded to register 0 ?

   Ans : 31

8. | Address | Content |
   |---|---|
   | 26 | 10 |
   | 27 | 33 |
   | 28 | 21 |
   | 29 | 10 |
   | 2A | 72 |
   | 2B | 10 |
   | 2C | 32 |
   | 2D | 2A |
   | 2E | C0 |
   | 2F | 00 |
   | 33 | 11 |

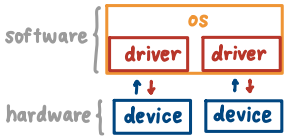
   What is the valve stored in address 2A after the program finish execution ?

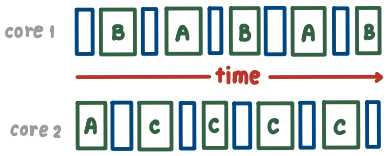
   Ans : 11

③ Operating System

OS - manages the hardware & running programs
- load & manage process
- provide interfaces to hardware via system calls
- provide a filesystem (read & write file → storage device)
- provide a basic UI

Device Driver - OS plug-in module for controlling a particular device

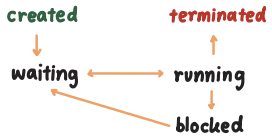




OS Process

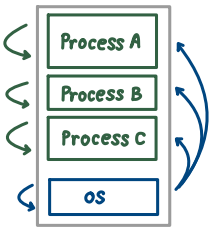
Pre-emtive multitasking

Scheduler in the OS code selects which process should run

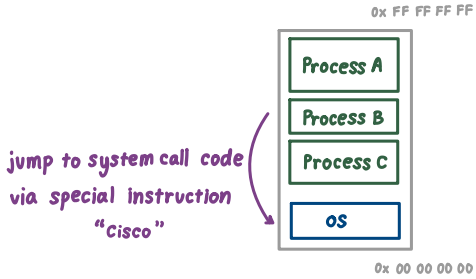


Process life cycle

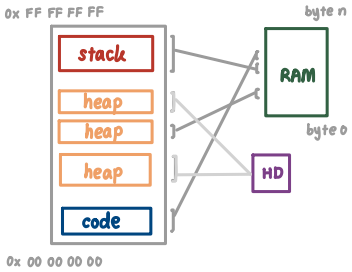
Managing Memory



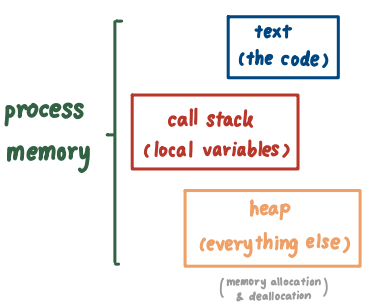
Separation of memory locations
Restriction of Access

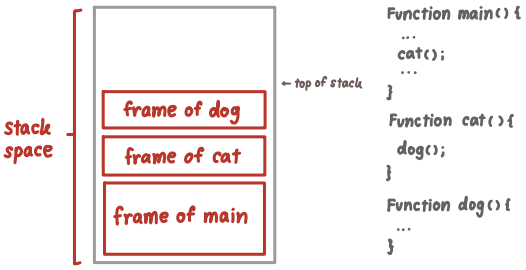


processes access OS' memory



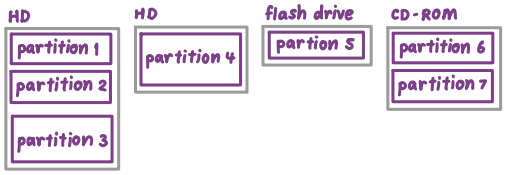
Handling Physical Memory






```
Function main() {
  ...
  cat();
  ...
}
Function cat() {
  dog();
}
Function dog() {
  ...
}
```

Managing Storage



Drive Letters / File path
Mount / Unmount Folders

Preparation

1. Which one is correct about Linux ?

   Ans : The 30 th anniversary of Linux was in 2021

2 Can Linux be found on a smart phone ? What's the proof ?

   Ans : Yes. Android is a Linux distro

3. On e a process is selected to run by schedvler, what is the state "process life cycle of that process called ?

   Ans : Running

4. What is Not the job of the OS ?

   · provide ways for users to move file in the Hard Disk Drive

   · let processes access computer hardware

   · allocate physical memory in RAM to processes

   Ans : None of the above is NOT the OS's job

5. In program, when functions (or methods) are invoked and returned, the program knows the memory address of the instruction to be executed next. Which part of the process memory is the most related to the ability mentioned above ?

   Ans : Stack

6. How does an OS let 2 process run on the same CPU core ?

   Ans : It lets the 2 different processes run on the CPU at different time interval

7. What allow processes to invoke routines which are stored in the region of memory that does not belong to processes but belong to OS ?

   Ans : System Calls

Swap

free - free memory (kilobyte)

free -m -free memory (megabyte)

bytearray(size_in_bytes) - take up the memory (Python)

fg [process_id] - go back to Python process that suspended

del [variable] - delete variable

sudo fallocate -l 1G /swapfile - create a file with 1 GB

sudo chmod 600 /swapfile - set file permission root-only

sudo mkswap /swapfile - make it a swapfile

sudo swapon /swapfile - register to system

sudo nano /etc/fstab } swap file every time system starts

t /swapfile none swap sw 0 0 }

Activity

Basic Linux commands

ls - list file in the current directory

pwd - print the path of the current directory

cd [PATH] - change current directory to [PATH]

echo [STRING] - print [STRING] as the program output

cp [SOURCE] [TARGET] - copy a given [SOURCE] file to [TARGET]

mv [SOURCE] [TARGET] - move a file [SOURCE] to [TARGET]

rm [FILE] - remove a file [FILE]

mkdir [NAME] - make directory (folder) [NAME]

cat [FILE] - print the content in [FILE]

I/o redirection

[COMMAND] > [OUTPUT FILE]

- redirect output of [COMMAND] to replace [OUTPUT FILE]

[COMMAND] >> [OUTPUT FILE]

- redirect output of [COMMAND] to append to [OUTPUT FILE]

[COMMAND] < [INPUT FILE]

- use [INPUT FILE] as input for [COMMAND]

command line app

cal - calendar

nano [FILE]

installing an app

sudo apt-get install [APPLICATION]

Managing User Accounts & Permission

Creating a new user account

sudo adduser [USERNAME] "super-user"

make the new user a "sudoer"

sudo usermod -aG sudo [USERNAME] "normal" · when need super privilege, prefix "sudo" in front of commands.

create a file

sudo su - [NEWUSERNAME] - change user

[COMMAND] > [OUTPUT FILE]

ownerships & permissions

read 4/r	owner	-rwx------
write 2/w	group	----rwx---
execute 1/x	other	-------rwx

ls -l [FILENAME] - check permission of a file.

sudo chown [username]:[group] [FILE] - change ownership

sudo chmod [permission] [FILE] - change permission

Shell & Shell Scripts

shell = command-line interpreter ex. bash, sh

#! shebang - specify a default command to execute this file

#! /bin/bash

chmod +x [FILE] - execute permission

./[FILE] - execute the file without explicitly specifying the command.

④ Embedded system

- a microprocessor/microcontroller-based system of hardware & software
- designed to perform dedicated functions within a larger mechanical /electrical system.
- IOT device.
- SUETCH (software program)

Preparation

1. What does 'IoT' stand for ?

   Ans : Internet of Things

2. What is false about digital pins on Arduino ?

   · There are 13 digital pins on the board

   · We can produce analog results via digital pin using PWM

   Ans: Digital pin are used for input only ×

3. Which is the closest statement in Java to loop() function in Arduino ?

   Ans : while (true)

4. Which line of code is valid in Arduino program ?

```
int pushButton = 2;
void setup(){
    Serial.begin(9600);
    pinMode(pushButton,INPUT);
}
```

   Ans: Serial.begin(9600);

5. If your pin isn't connected to anything, what will the function digitalRead() return ?

   Ans: Either HIGH or LOW value

6. What command make the board wait for 1 second before doing next command ?

   Ans: Delay(1000); (milli second)

7. When is setup() function called ?

   Ans: Both powerup and reset the board.

Activity

Part 1 – toggle the LED

```
const int LED_PIN = 2;
const int BUTTON_PIN = 3;
int buttonState = 0;

void setup(){ run once on startup
    pinMode(LED_PIN, OUTPUT);
    pinMode(BUTTON_PIN, INPUT);
}

void loop(){ run forever
    buttonState += digitalRead(BUTTON_PIN);
    if(buttonState %2 == 1){
        digitalWrite(LED_PIN, HIGH);
    }
    if(buttonState %2 == 0){
        digitalWrite(LED_PIN, LOW);
    }
}
```

Part 2 Baud Rate - speed of serial communications between 2 electronic devices. (bits per second)

PWM (Pulse Width Modulation) 0-255 ; 0 = 0% , 255 = 100%

```
const int LED_PIN = 2;
const int BUTTON_PIN = 3;
int ledState = LOW;

void setup() {
    pinMode(LED_PIN, OUTPUT);
    pinMode(BUTTON_PIN, INPUT);
    Serial.begin(115200);
    Serial.println("\n\nHello world!!!");
}

void loop() {
    if(Serial.available() > 0) {
        char inChar = Serial.read();
        if(inChar == '0') {
            ledState = LOW;
            Serial.println("Turn Off");

        } else if(inChar == '1') {
            ledState = HIGH;
            Serial.println("Turn On");
        }
    }
    digitalWrite(LED_PIN, ledState);
}
```

Send '1' turns on the LED
send '0' turns off the LED

```
const int LED = 2;
const int BUTTON = 3;
int brightnessLevel = 0;
int current = 0;

void setup() {
    pinMode(LED, OUTPUT);
    pinMode(BUTTON, INPUT);
    Serial.begin(115200);
    Serial.println("\n\nHello world!!!");
}
void loop() {
    if (Serial.available()) {
        brightnessLevel = Serial.read() -'0';
        if(brightnessLevel != current){
            current = brightnessLevel*10;
        }
    }
    digitalWrite(LED,HIGH);
    delay(current);
    digitalWrite(LED,LOW);
    delay(100-current);
}
```

bit banging PWM method

⑤ Front end

user → request for web / resource → Communication Networks → Server

IP Address – unique identifier

DNS (Domain Name System) – translate user-friendly domain name (www. ... .com) → corresponding IP address

URLs

- Protocol - HTTP, HTTPS (secure)
- Domain Name – top-level domain (TLD) at the end (ex. .com, .org, .net), subdomain (www.)
- Path – specifies the location in the server's directory structure
- Query Parameters (after ?) – modify behavior of resource / request
- Fragment Identifier (after #) – point to specific section in web

HTML – content & layout

CSS – appearance

JavaScript – implement feature

HTML

<!DOCTYPE html> : declare that you're using HTML5

<html> : root element

<head>

<meta charset="UTF-8">

<title> : title in browser tab

<body>

<h1> (6 levels)

<p> : paragraph

- opening tag & closing tag
- attribute (addition information)

ex. visit Example
attribute value

<table>

<caption> : table's purpose

<thead>

<tbody>

<tfoot>

<tr> : table row

<th> : table header cell

<td> : contain actual data

<img src="..." alt="...">

<a> : anchor create link

css selector

id : uniquely identify a single element

. class : shared among multiple elements

Semantic Tags : convey meaning

Non-semantic Tags : layout & styling

Unordered List

Ordered List

<link> : connect to CSS

DOM (Document Object Model)

: root node - child nodes

Preparation

1. นายสมชายเปิด Web Browser และพยายามไปที่ www.mycoursevile.com

   แต่หน้าจอ Web Browser แสดงข้อความ Error โดยมีสาเหตุคือ ERR_NAME_NOT_RESOLVED

   ซึ่งหมายความว่า Web Browser ไม่สามารถหา IP Address ของ www.mycoursevile.com ได้

   สาเหตุนี้น่าจะเกิดความผิดพลาดที่เกี่ยวข้องกับส่วนประกอบในข้อใด

   Ans : DNS

2. ข้อใดเปรียบเทียบส่วนประกอบของหน้าเว็บได้ตรงกับเนื้อความข้างต้น

   Ans : HTML เปรียบเสมือนโครงร่าง CSS เปรียบเสมือนของตกแต่ง JavaScript เปรียบเสมือน ฟังก์ชันการทำงาน

3. ข้อใดเป็นหน้าที่การพัฒนาเว็บฝั่ง Front-end

   Ans : การพัฒนาเกี่ยวกับ User Interface (UI)

4. ข้อใดเป็นหน้าที่การพัฒนาเว็บฝั่ง Back-end

   Ans : การเขียนโปรแกรมเพื่อคืนค่าจากฐานข้อมูล

5. A good tutorial

   ข้อใดเป็นชื่อ attribute

   Ans : href

6. สมมติว่าท่านกำลังเขียนหน้าเว็บแนะนำการเดินทางในกรุงเทพมหานคร หากมี <h2> หัวข้อหนึ่งเป็น "กิจกรรมน่าสนใจรอบสถานี BTS" มี <h3> หัวข้อหนึ่งเป็น "สยาม" มี <h3> อีกหัวข้อหนึ่งเป็น "สนามเป้า" และมี <h4> หัวข้อหนึ่งเป็น "ตะลุยกินบนถนนบรรทัดทอง" หากมีหัวข้อหนึ่งเป็นชื่อสถานี "ศาลาแดง" หัวข้อนี้ควรใช้ HTML element ใด

   Ans : <h3>

7. ในหน้าเว็บแนะนำการเดินทางในกรุงเทพมหานคร หากต้องการแสดงรายการ วัดในเขตพระนคร และขั้นตอนการซื้อบัตรโดยสาร BTS ควรใช้ HTML Element ใดตามลำดับ

   Ans : <ul>,

8. HTML Element ใดที่ใช้บรรยายข้อมูลในหนึ่งแถวของตาราง

   Ans : <td>, <tr>

9. ข้อใดเป็น Non-Semantic HTML tag

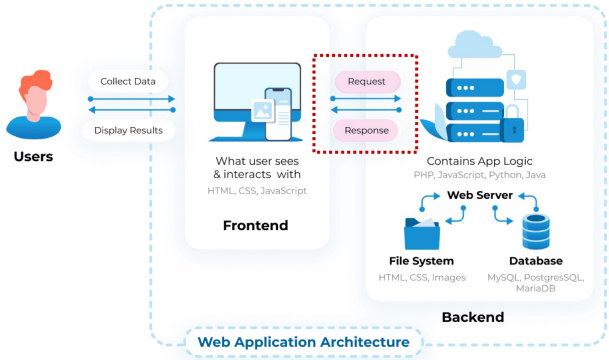
   Ans : div

10. HTML DOM (Document Object Model) มีความสำคัญอย่างไรในการพัฒนาหน้าเว็บ

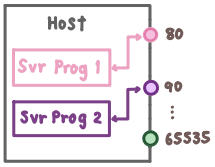
    Ans : เป็นโครงสร้างที่ใช้ในการแสดงผลของหน้าเว็บ ช่วยให้สามารถเข้าถึง element ต่างๆ

⑥ Back end -1

Web Application Architecture



Server on Internet



IP = 18.136.16566
Name = lab.aimet.tech

host - machine/server connecting to Internet
- IP, hostname

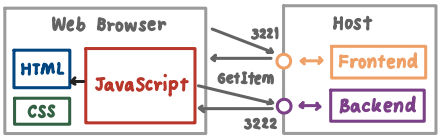
port - program on host communicate with other server /clients via "port"
- 65536 ports

HTTP Protocol

Request - Reply Protocol

REST API - HTTP Request Method

GET : request to server
PUT : update data
POST : create new data
DELETE : delete data



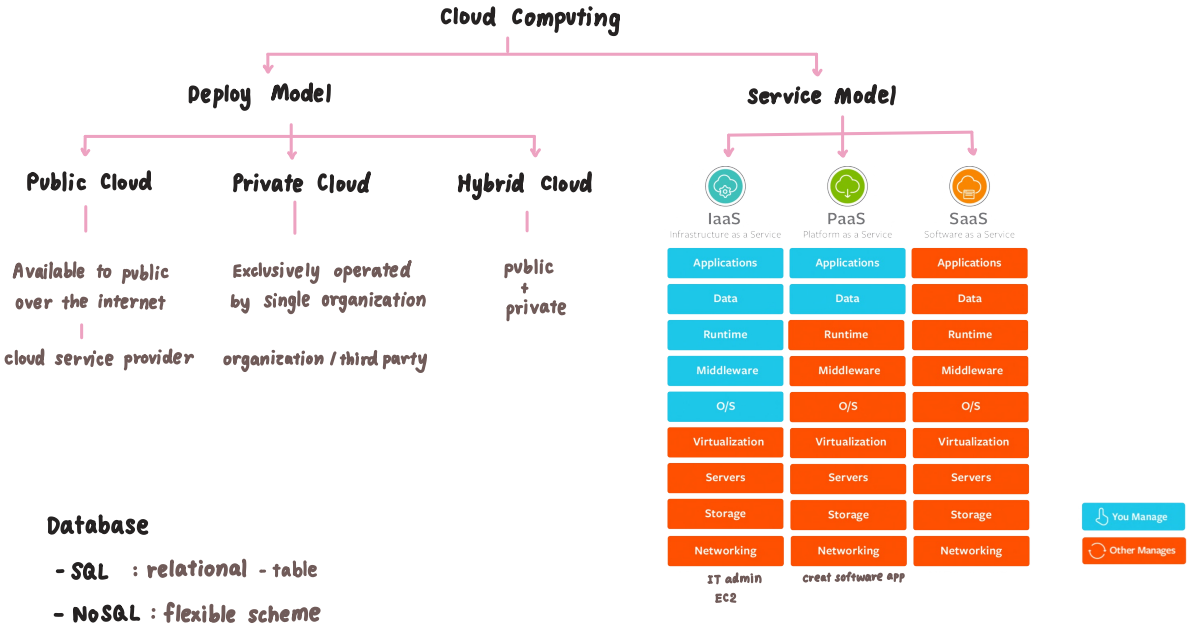
JSON : Data Representation Format {"key":"value"}

Frontend Server

curl -v : verbose underlying operation
> : request sent from curl → frontend server
< : respond sent from backend - first line : header "empty line" body : HTML content
200 : respond code for success
501 : Not Implemented

⑥ Back end - Cloud Computing

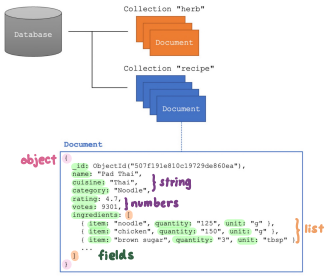
On-premises	Cloud
Scalability pay ↑ option ↓	pay only how much you use
infrastructure maintenance cost	cloud service provider manage & maintenance
server storage : lot of space	
data security ↓	data security ↑
recovery ↓	recovery ↑

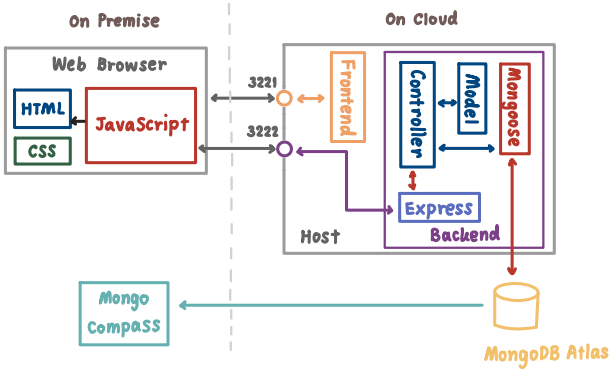


Database

- SQL : relational - table
- NoSQL : flexible scheme
  - document store (Database - Collections - Documents)

JSON





Prepartion - 1

1. Is it true that JSON only available in Javascript?

   Ans : False

2. Which of the following is invalid JSON?

   ✓ {"null": []} , {"true": ["value", {"key": "another value"}, null]} , {"s": 4, "6": null}

   Ans : {"hello': 'world"}

3. What is the purpose of npm?

   Ans: To manage javascript package.

4. Why do we need to specify port on our server but not on the other server?

   Ans : Because we're using non-default port.

5. Is it possible to host frontend and backend on the same express server?

   Ans: Yes, because requesting HTML from server is one type of HTTP request.

6. The famous 404 Not Found is one code of

   Ans: HTTP response status code.

7. In express, how do you specify and access variable in path parameter?

   Ans: app.get("/items/:id", (req, res) => {...}), const {id} = req.params

8. Why in our frontend code, BACKEND_URL is EC2 Public IP instead of localhost since the frontend and backend run on the same server?

   Ans: Because the request is made from the visitor's device.

9. Which of the following does not follow conventions?

   - Use POST to mutate data
   - Use GET to search data

   Ans : Use GET to delete data.

Activity - 1

1. Run curl -v command to get content from http://<YOUR-IP>:3221. What's the response code returning from the frontend server?

   Ans : 200

2. After running command in #1, what is the first line of the request?

   Ans : > GET / HTTP/1.1

3. After running command in #1, what is the first line of the header of the response?

   Ans : < HTTP/1.1 200 OK / * Trying XX.XX.XX.XX:3221..

4. After running command in #1, what is the first line of the body of the response?

   Ans : <!DOCTYPE html><html lang="en">

5. How the server generate content to response for curl -v command to get content from http://<YOUR-IP>:3221.

   Ans : Get from frontend/public/index.html

6. Run curl -v command to get content from http://<YOUR-IP>:3221/xxx. What's the response code returning the frontend server?

   Ans : 404

7. Which code add listener to click botton "เพิ่ม"?

   Ans: frontend/public/scripts/main.js at line 11.

8. Which function is the "first" function being called when button "เพิ่ม" is called?

   Ans : handleCreateItem

9. Which code call REST API from the backend server?

   Ans : frontend/public/scripts/api at line 17

10. Which code creates an express object?

    Ans: backend/src/app.js at line 6

11. Which function in the backend that handles the request for GET method?

    Ans : ItemController.getItems

12. Which code registers function that handles POST methods?

    Ans : backend/src/routes/ItemRoute.js at line 8

13. When you click "เพิ่ม" button, what is the sequence of function call?

    Ans : handleCreatItem - createItem - itemController.createItem - ItemFromObject
    handleCreatItem - createItem - fetchAndDrawTable

14. When you use postman to get item via REST API, what is the sequence of function call?

    Ans : itemController.getItems

Preparation - 2

1. Which one is not type of cloud computing?

   Ans: MaaS

2. Which type of cloud computing is EC2 ?

   Ans : IaaS

3. Popular frontend's cloud like Vercel and Netlify allow you to upload code of project written in React,

   Vue and many other popular frameworks, then it handle the build process and deploy the frontend application

   for you. What type of cloud computing is this?

   Ans : PaaS

4. Which one is not the deployment model of cloud computing?

   Ans : Static

5. You plan to deploy a service as small web apps but you do not want to buy an expensive server just to host your

   small app. So, you decide to use cloud to host your web apps insteads. Is this situation correctly exploating the advantages of cloud computing?

   Ans : Yes, because cloud can save you money because it bills as you use.

6. Is MongoDB SQL or NoSQL?

   Ans : NoSQL.

7. How data is stored inside MongoDB ?

   Ans : JSON

8. What is MongoDB cloud platform called ?

   Ans : MongoDB Atlas

9. What is the default port for MongoDB? We usually run each database in its default port.

   Ans : 27017

Activity - 2

Filter : `{age : {$gt : 40}}`

`{age : {$lt : 40}}`

Sort : `{age : -1}`

Or : `{$or : [{department : "Sales"}, {department : "HR"}]}`