Introduction to Information Systems

– Understanding the digital world

7 Operating System and Software Systems

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Today's schedule

- Review of the Scratch game (10')
- BIOS (5')
- Operating System & Software (55')
- Mini test (15')
- Information and homework (5')

Review of the game

Received (before 10am today):

1120201012 1120220016 1120221019 1120230004 1120230011
1120230013 1120231003 1120231004 1120231008 1120231012
1120231015 1120240002 1120240005 1120240008 1120240011
1120240012 1120240014 1120240015 1120240018 1120240019
1120240021 1120240023 1120240025 1120240028 1120240029
1120240031 1120240032 1120241002 1120241008 1120241011
1120241017 1120241019 1120241020 1120241021 1120241029

No access or no submission:

Late submission is better than no submission!

1120191006 1120200019 1120211008 1120211015 1120211018
1120211023 1120220003 1120221005 1120230001 1120230009
1120230019 1120231009 1120231014 1120231017 1120240001
1120240007 1120240009 1120240013 1120240016 1120240022
1120240027 1120240030 1120241009 1120241024 1120241026

Some of my favorite submissions

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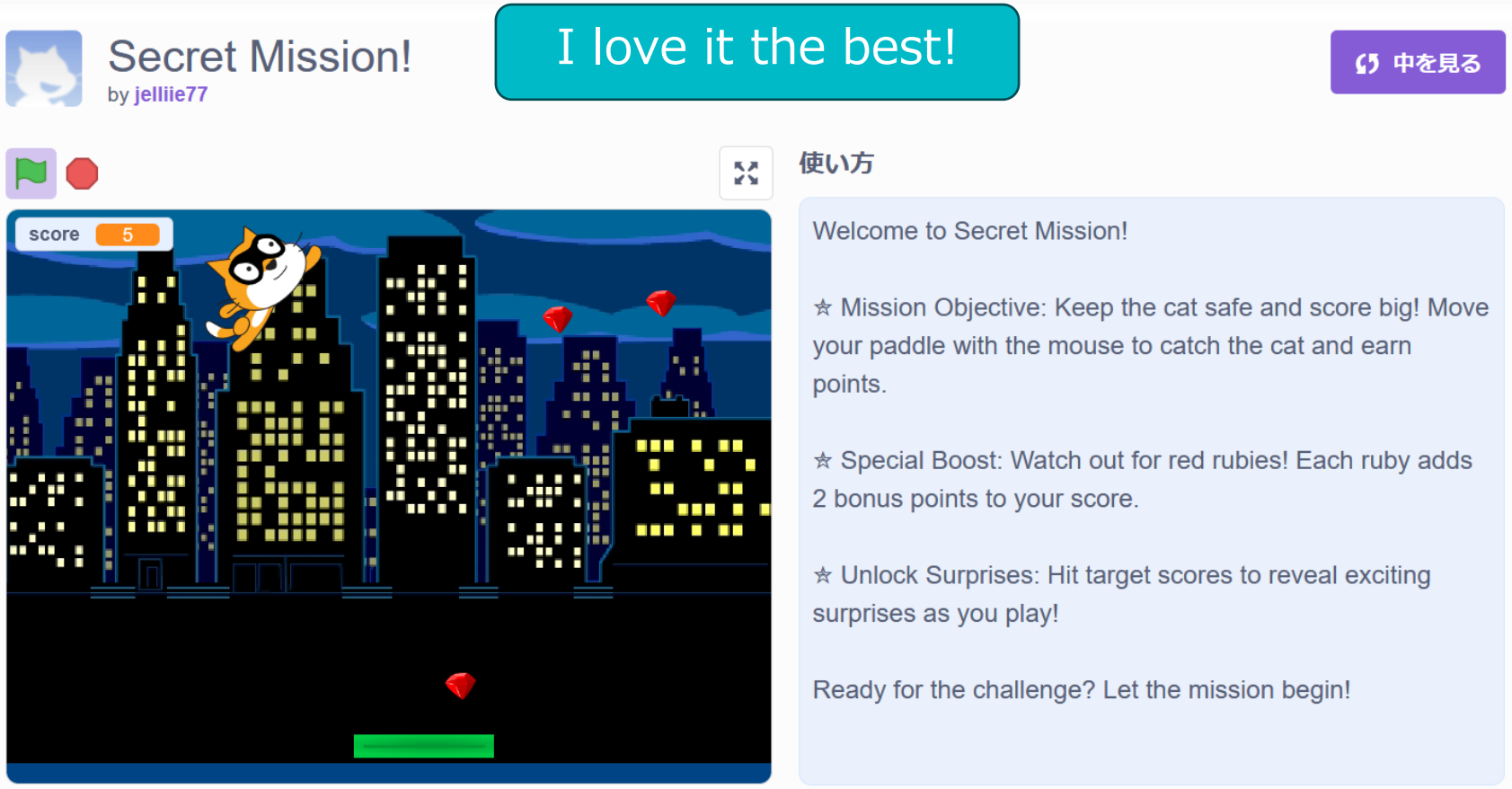
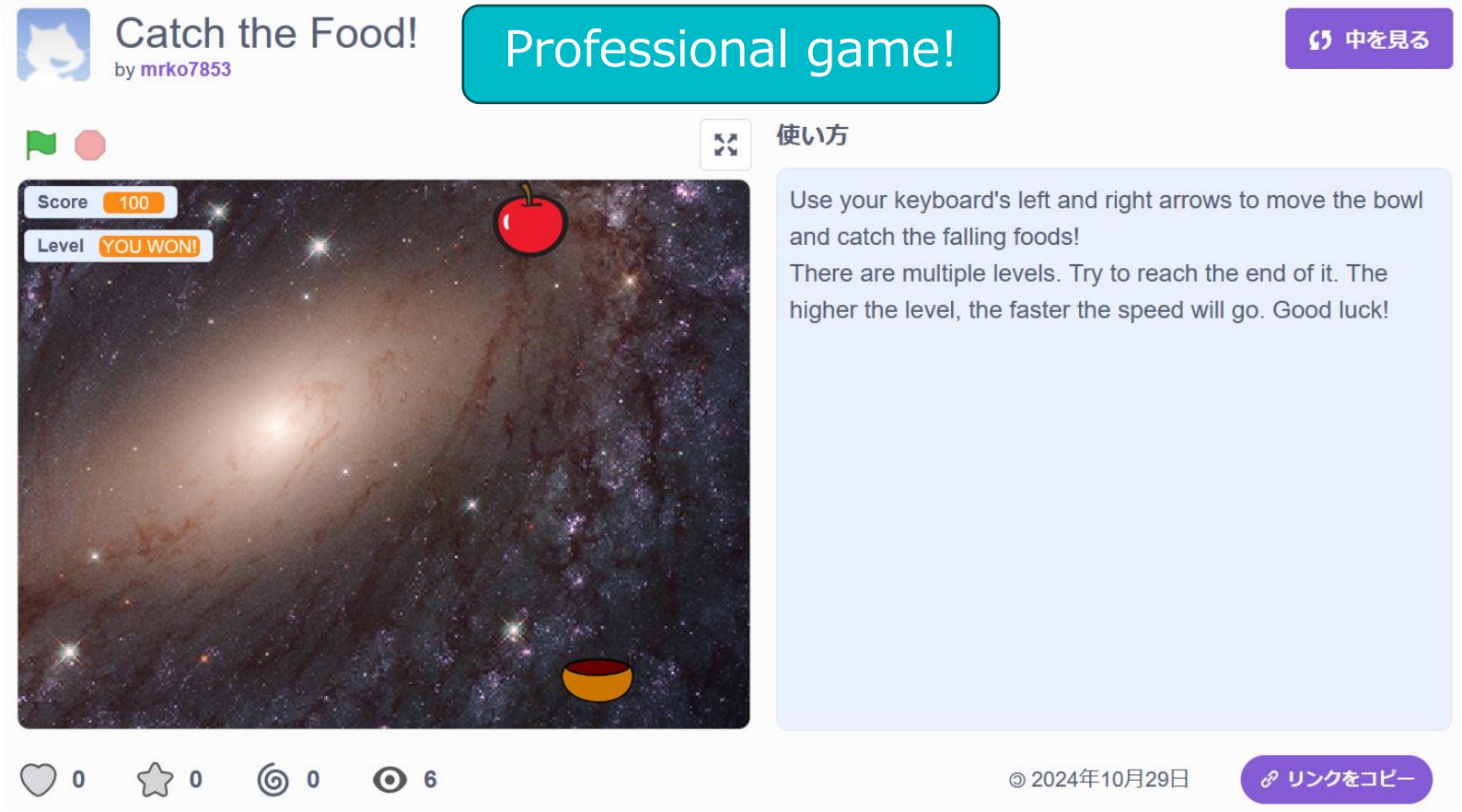
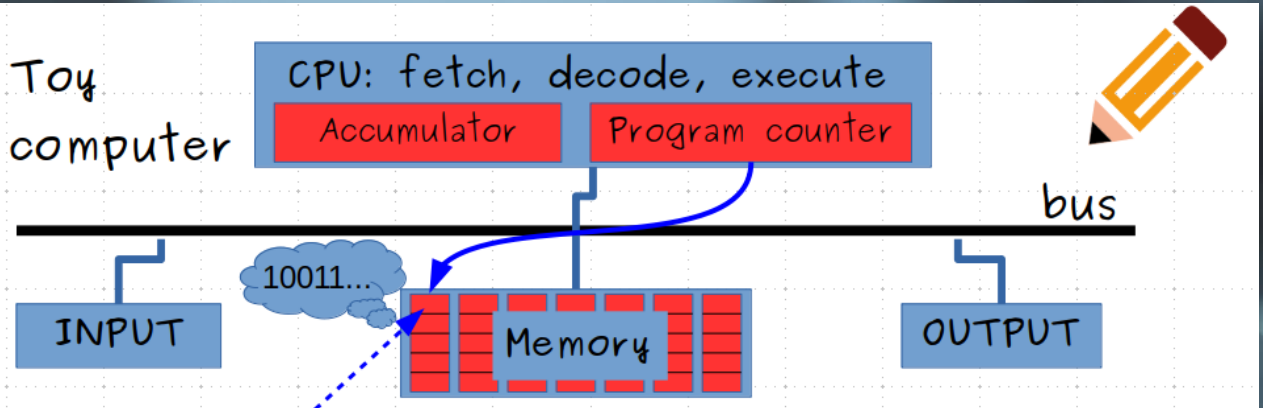


Some of my favorite submissions





label	instruction	description
	get	get a number from keyboard into accumulator
L	print	print contents of accumulator
	load Val	load accumulator with Val (Val unchanged)
	store M	store contents of accumulator into memory location called M
	add Val	add Val to contents of accumulator (Val unchanged)
	sub Val	subtract Val from contents of accumulator (Val unchanged)
	goto L	go to instruction labeled L
	ifpos L	go to instruction labeled L if accumulator is >= zero
	ifzero L	go to instruction labeled L if accumulator is zero
	stop	stop running
M	Num	before program runs, set this memory location (called M) to Num

BIOS

- Basic Input/Output System (BIOS): firmware used to perform hardware initialization during the booting process (power-on startup), and to provide runtime services for operating systems and programs. (https://en.wikipedia.org/wiki/BIOS)
- In short, the firmware that connects hardware and software.
- https://www.youtube.com/watch?v=D1R2ttrvbdI (6', optional)

OS (Operating System)

With OS, we don't need to write millions of lines of code by ourselves in order to use a computer.

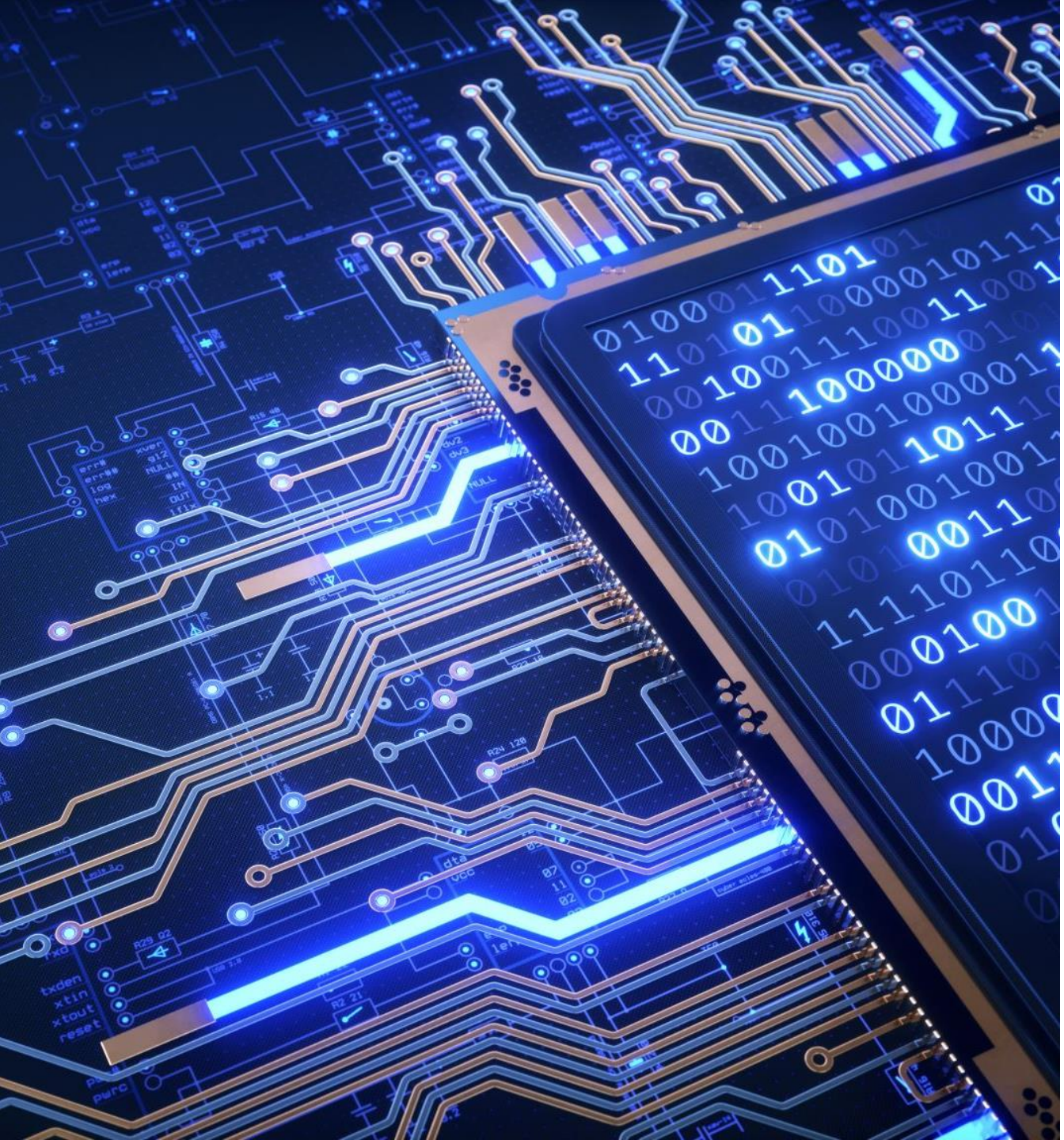
- CPU (task management)
- Disk (HDD, SSD, etc) and file
- RAM (memory)
- Devices (monitor, keyboard, mice, printer, etc)

Memory (RAM) management

Loads programs and data into memory.

Swaps them to disk when memory is low.

Protects the programs from interfering.



CPU (task management)

Single-task (DOS, etc)

Multi-task (Unix/Linux, Windows, Mac OS, etc)

Crash course -> Computer Science #18 (14')
https://www.youtube.com/watch?v=26QPDBe-NB8

Disk and file management

- File System (FAT, FAT32, NTFS, ext4, APFS, etc)
- Directory (folder): special container file
- Executable files (Word, Photoshop, etc)
- Documents (txt, doc, jpg, mp3, html, etc)
- System files (lib, sys, etc)
- Extension distinguishes types: doc/docx -> Word document, jpg -> JPEG file (editable by Photoshop etc), exe -> executable file, ...

Crash Course -> Computer Science #20 (12')

https://www.youtube.com/watch?v=KN8YgJnShPM

Comment of “path” and location of a file

Absolution path: e.g., **C:¥Users¥liang¥Desktop¥book.docx** (Windows, starting with the **drive**) and **/home/liang/Desktop/book.docx** (UNIX/Linux/Mac, starting with the root “**/**”)

Relative path: path that is related to the **working directory** (W.D., directory where we are working with). E.g., if W.D. is **C:¥Users¥liang**, then **Desktop¥book.docx** means **C:¥Users¥liang¥Desktop¥book.docx**.

URI extends this notation with protocol and server name: e.g., (where **protocol** = https, **server name** = ila.doshisha.ac.jp) **https://ila.doshisha.ac.jp/en/index.html**

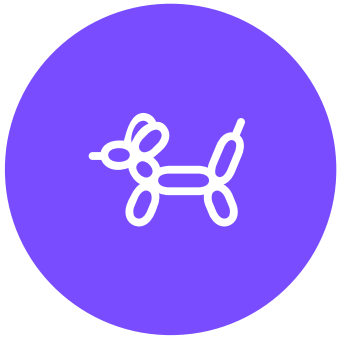
Shell

User <-> OS interface software

Crash course -> Computer Science 22 (11')

https://www.youtube.com/watch?v=4RPtJ9UyHS0

Homework



WATCH VIDEOS

Watch the movies mentioned so far if you have not
(You are not expected to understand everything)

READ CHAPTERS 1-6

(IF YOU HAVE NOT)

Appendix: Advanced topics

Device driver: program for a special hardware. Ex: printer drivers provide detailed control (two-sided printing, etc).

System call: function provided by the OS to apps. Ex: input, drawing on the display (DirectX, OpenGL), network function, etc.

Memory management: Crash Course -> Computer Science #19 https://www.youtube.com/watch?v=TQCr9RV7twk

Other Oses: Linux, FreeBSD, Android, etc