



Introduction to Information Systems

- Understanding the digital world

Liang Zhao (Dr. Informatics)

ILA, Doshisha University

12001102, Fall, 2025



Information systems are everywhere



Let us find computers around us.

Syllabus (1/3)

NOT for these students.

- Expert level.
- Only interested in the use.

Summary: Provide an **overview** of information systems including hardware and software **fundamentals**, **coding**, effective and secure use of the Internet and other **communication** tools, **Artificial Intelligence** (AI), as well as the **ethical** use of computers in business and society through **hands-on activities** and **assignments**.

Goal: Learn basic concepts and knowledge to understand digital computers and communications including hardware, software, Internet, World-Wide Web (WWW), AI, software license, information security and others, as well as coding and web page creation.

Syllabus (2/3)

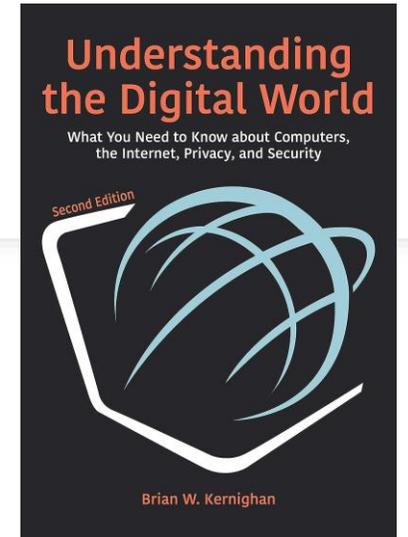
Style: Hybrid of **normal teaching** and **flip classroom** (i.e., in class: mini tests, reviews, summary videos, and classwork; at home: textbook reading and online learning).

Evaluation Criteria: Each lecture has **7pt** (**2 for attendance** and **5 for mini test**). The total is thus $7\text{pt} \times 15 \text{ lectures} = 105\text{pt}$ with a max of 100pt. **Bonus** points are given to **challenging** tasks. **General note:** Attendance is evaluated by if the student followed the instructions, while assignment (mini test) is evaluated by the correctness or completeness of the answer.



Syllabus (3/3)

Textbook: B.W. Kernighan, **Understanding the digital world**, Princeton University, 2021 (1st edition is also fine. Both paper and e-book are OK).



Schedule: **1** What is in a Computer, **2** Bit, Bytes and Representation of Information, **3** Inside the CPU, **4** Programming, **5** Algorithms, Programming and Programming Languages, **6** Programming with Python and Scratch, **7** Operating System and Software Systems, **8** Javascript and HTML, **9** Communication and Networks, **10** The Internet, **11** Data and Information, **12** Privacy and Security, **13** The World-Wide Web (WWW), HTML, and Wiki, **14** Artificial Intelligence (AI) and the Future of Computing, **15** The Future of Information System and Overall Review

Information

E-Class will be used as the major support platform.
You can find it from the Home Page of Doshisha
Univ -> (Visitors menu) Current Students -> e-class.

After-lecture support: See Contact (questions and discussions are welcome).

General note: You are not expected to understand everything. If you find a topic or the textbook is difficult, please ask or skip it. If too simple, please go forward, challenge the bonus task, share with or teach other students - but **please keep your voice low.**

On the use of ChatGPT: By default, NO (for education purpose). Will have some practice with it.

A general introduction on computers



History of computer (12')

https://www.youtube.com/watch?v=05nskjZ_Gol



Electronic Computing (11')

<https://www.youtube.com/watch?v=LNDucKNX0hc>

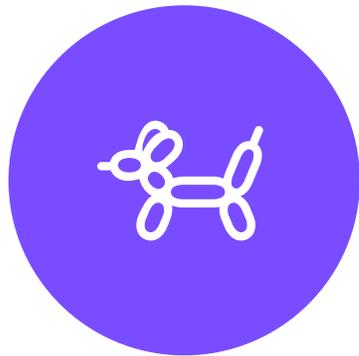
What is in a computer



Inside modern computer (10')

<https://www.youtube.com/watch?v=ExxFxD40SZ0>

Mini test and homework



MINI TEST



**HOMework: READ CHAPTERS 1
AND 2 OF THE TEXTBOOK**



Introduction to Information Systems - Understanding the digital world

2 Bit, Bytes and Representation of Information

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025



<https://aw.gsais.kyoto-u.ac.jp/liang/lectures>



Today's schedule

- **Review of lecture 1 (15')**
- **On the Mini test (5')**
- **Why you need to understand the digital world (5')**
- **Review of Chapters 1 & 2 of the textbook (15')**
- **Mini test #2 and homework (50')**

Review: Syllabus (1/3)

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Summary: Provide an **overview** of information systems including hardware and software **fundamentals**, **coding**, effective and secure use of the Internet and other **communication** tools, **Artificial Intelligence** (AI), as well as the **ethical** use of computers in business and society through **hands-on activities** and **assignments**.

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Review: Syllabus (2/3)

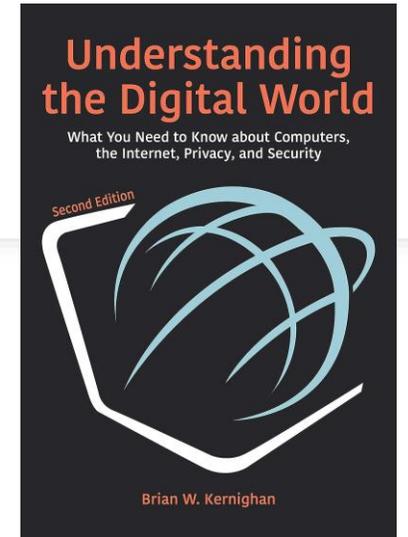
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Review: Syllabus (3/3)

Textbook: B.W. Kernighan, **Understanding the digital world**, Princeton University, 2021 (1st edition is also fine. Both paper and e-book are OK).



Schedule: **1** What is in a Computer, **2** Bit, Bytes and Representation of Information, **3** Inside the CPU, **4** Programming, **5** Algorithms, Programming and Programming Languages, **6** Programming with Python and Scratch, **7** Operating System and Software Systems, **8** Javascript and HTML, **9** Communication and Networks, **10** The Internet, **11** Data and Information, **12** Privacy and Security, **13** The World-Wide Web (WWW), HTML, and Wiki, **14** Artificial Intelligence (AI) and the Future of Computing, **15** The Future of Information System and Overall Review

Review: Information

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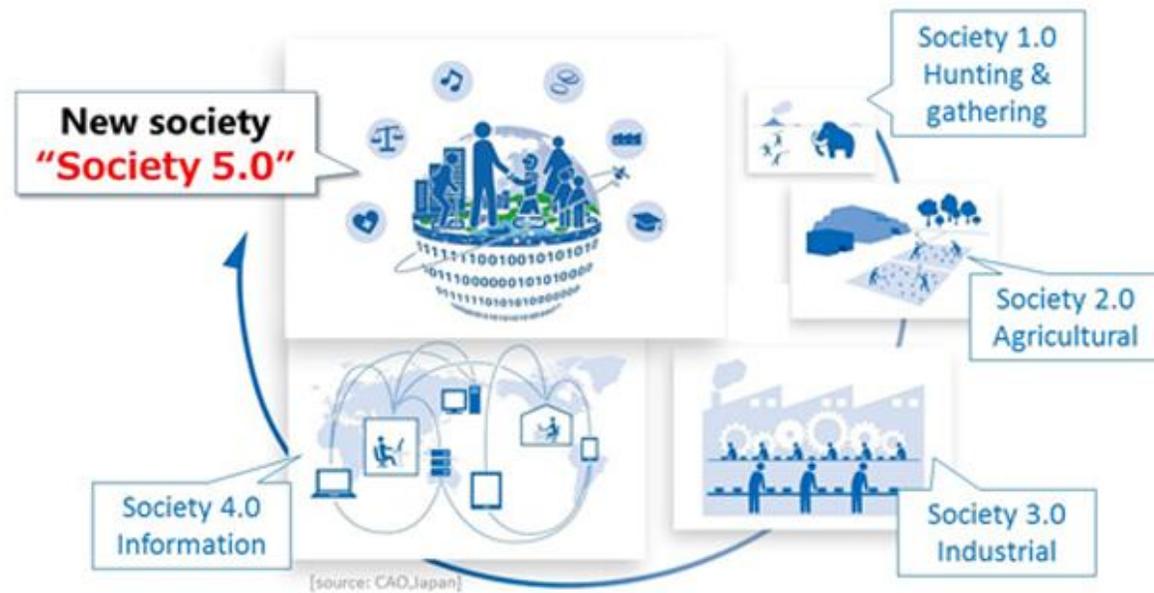
On the use of ChatGPT and other generative AI: By default, NO (for learning purpose). We will have some practice with it tho.



On Mini tests

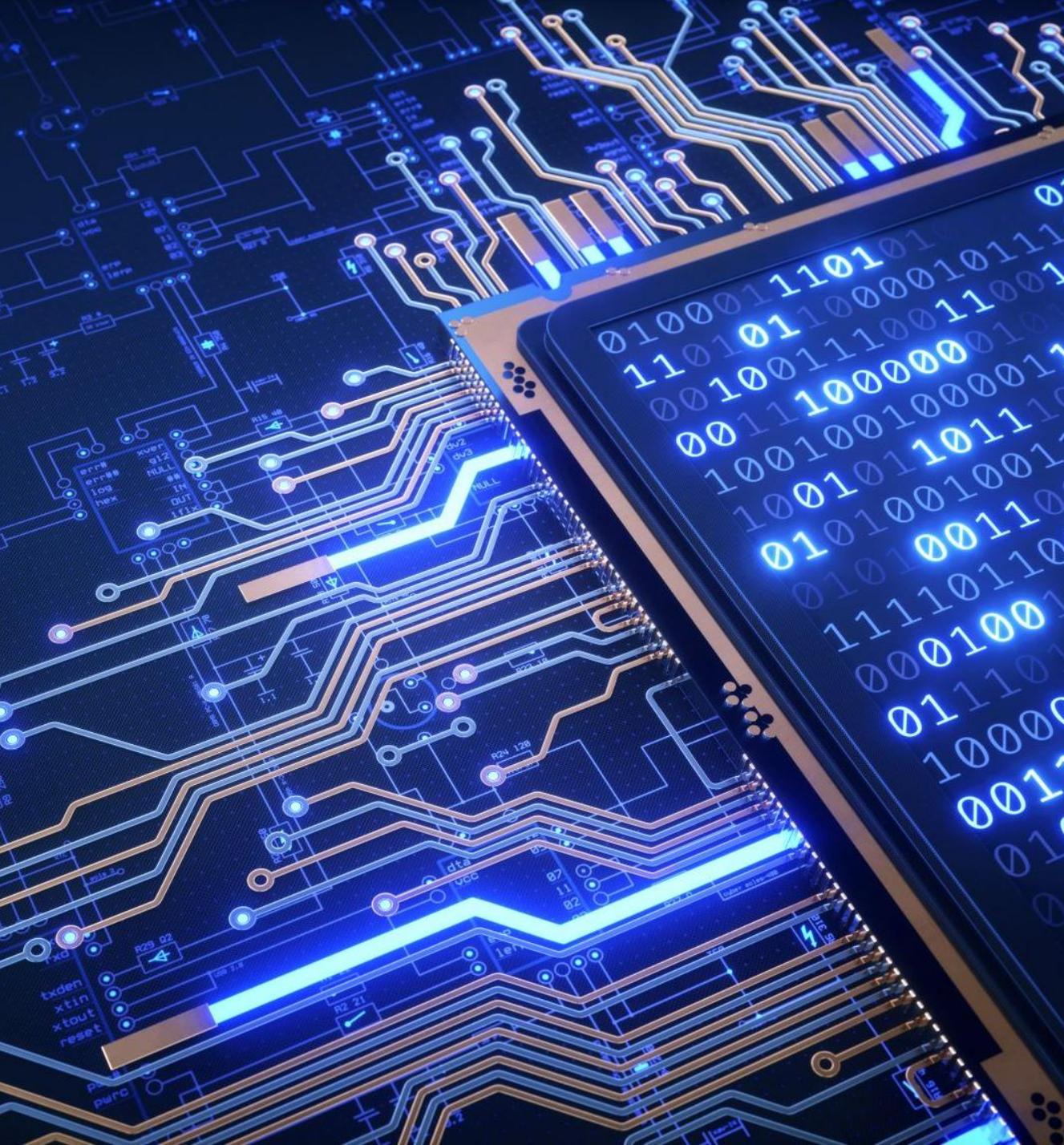
- For Mini test #1, you can submit a hard copy or by email (PDF preferred).
- For #2 and the following, **randomly assigned numbers** are used for anonymous grading. Your number has been sent by email yesterday.
- Better late than never (with a penalty of -2 points).

Why you need to understand the digital world



The world is becoming digital (Society 5.0).
As a "digital native," you are expected to understand the digital world :-).

You are with the humanity discipline (culture, economics, law, etc). This human-centered approach is heavily biased, and a non-human-centered approach is needed.



Review of Chapters 1 & 2 of the textbook

- **Part I: Hardware**
- **Chapter 1: What's in a computer**
- **Chapter 2: Bit, Byte, and Representation of information**

What's in a computer

CPU, RAM, Disk (HDD/SSD), bus,
Motherboard, USB, etc

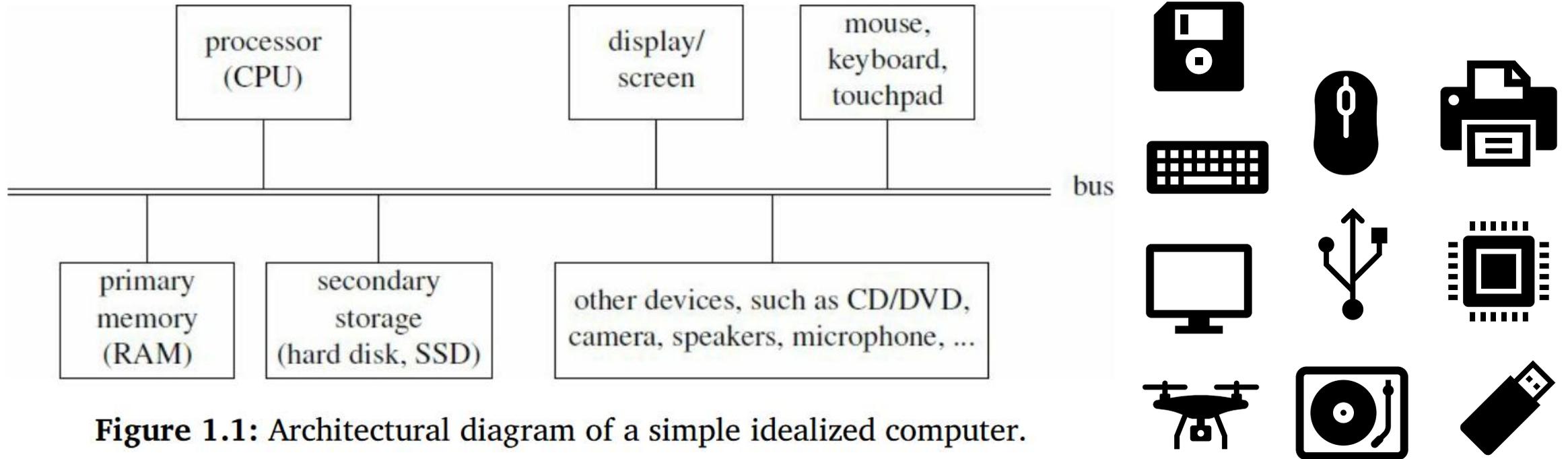
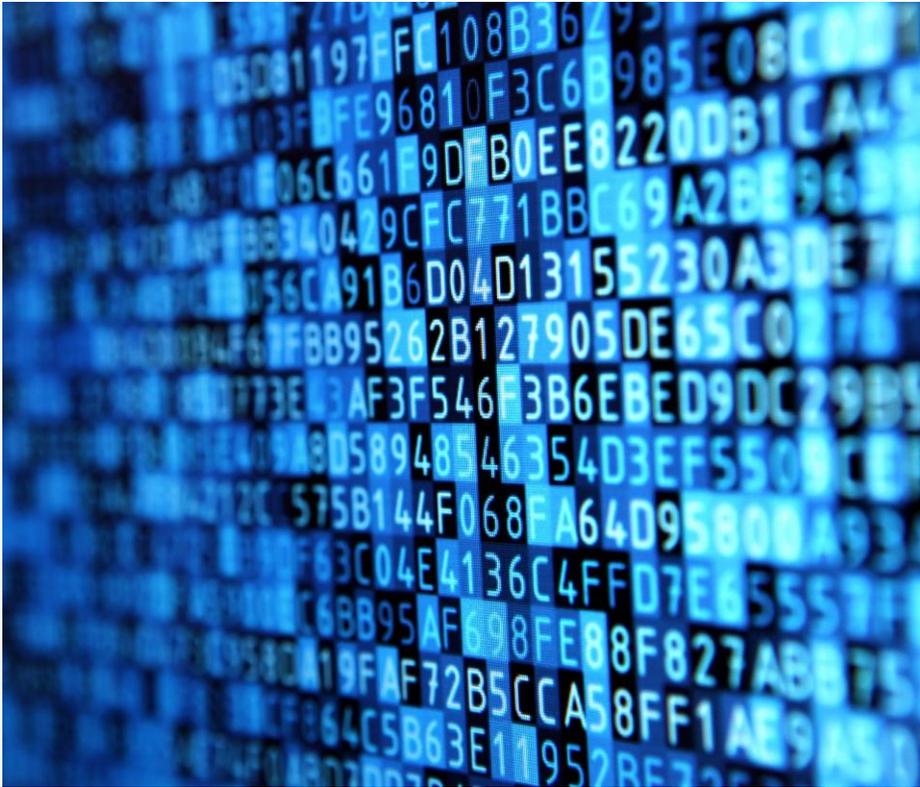


Figure 1.1: Architectural diagram of a simple idealized computer.

Bit, Byte, and Representation of information

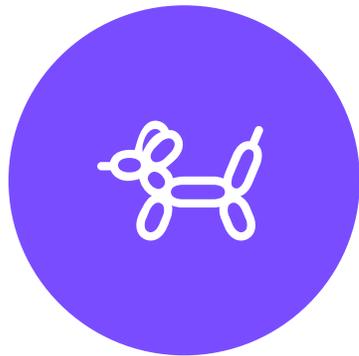


- Analog and digital
- Bit: the smallest unit of information
- Byte: a fixed group (usually 8) of bits
- Base of numbers (binary, decimal, hexadecimal)
- How to convert numbers of different bases
- Why it is said that "There are only 10 kinds of people in the world—those who understand binary numbers and those who don't."?



Write the correct assigned number on the paper!

Mini test and homework



MINI TEST (45')



**HOMEWORK: READ CHAPTER 3 OF
THE TEXTBOOK**

The test is open - the use of book, Internet, YouTube, etc, is OK - but please fill it by yourself. Don't worry if you cannot complete all now - You will learn them in this course.



Introduction to Information Systems

- Understanding the digital world

3 Inside the CPU

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12001102, Fall, 2025



<https://aw.gsais.kyoto-u.ac.jp/liang/lectures>



Today's schedule

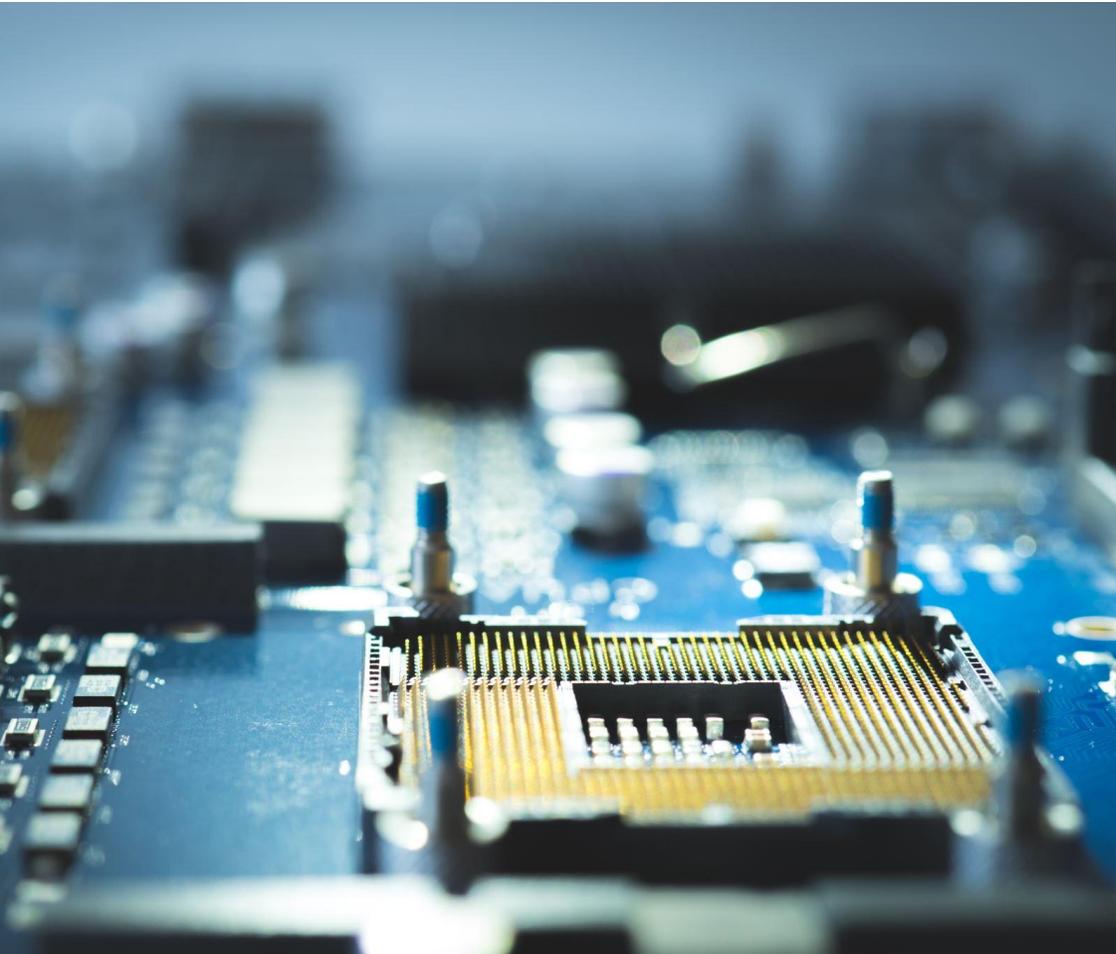
A reference (June 10, 2025):

<https://www.media.mit.edu/publications/your-brain-on-chatgpt/>



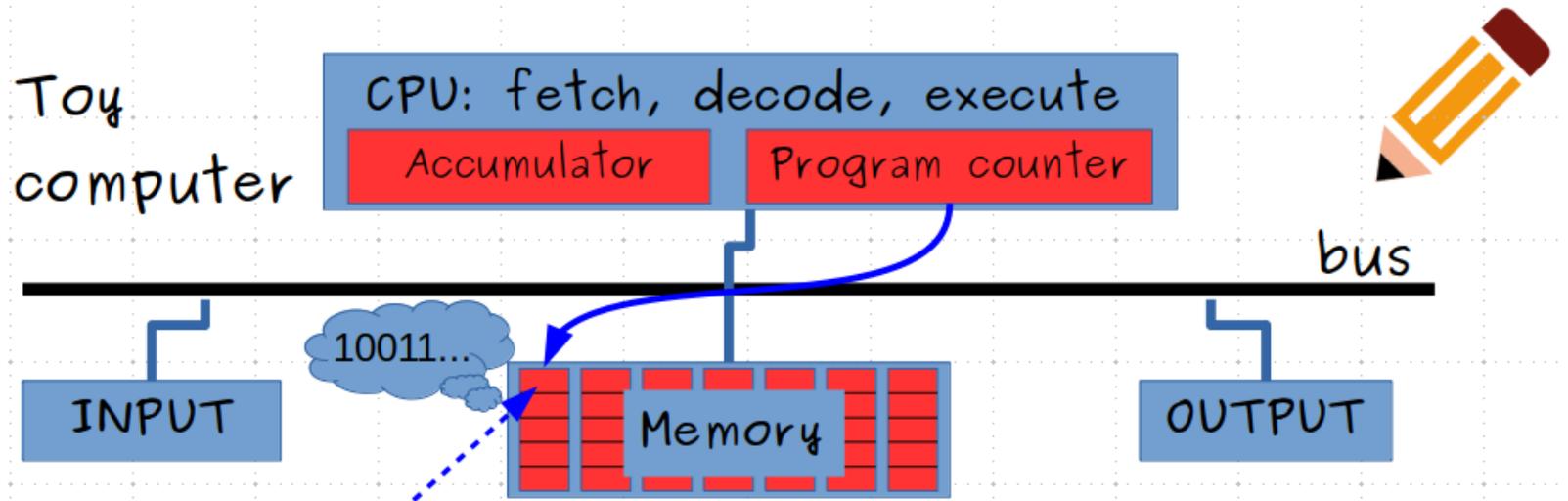
- **Review of Mini test #2 (5')**
- **Mini test #3 (25')**
- **CPU: Review of Chapter 3 (10')**
- **Coding with the Toy Machine (50')**

CPU (Central Processing Unit)



CPU performs:

- Arithmetic: +, -, x, /, etc.. (like a calculator with more but still very limited functions)
- Fetch/store/operate data from/to/in the memory (RAM)
- Coordinate input, output and others
- Compare numbers and decide the next to do
- Note: Instructions and data are in the RAM.



Toy Machine & instructions

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 \geq 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

Ex. 1: First program

- Go to <http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>
- Input the program into the left box. Notice a space is required before the first letter (read the instructions).
- Click "Run" and input some **number** (e.g., 367) when asked, then check the output in the right box.
- In case of error, revise your program, spell, space, input, etc. (called debug).

The screenshot shows a web browser window titled "COS 109 Toy Machine Simulator - Mozilla Firefox". The address bar shows the URL "https://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html". The page content includes instructions for using the simulator, a code editor with the program "GET PRINT STOP", a "Run" button, a "Clear output" button, an "Accumulator" input field, and a "Syntax reminder" section.

COS 109 Toy Machine Simulator

(You must have Javascript enabled.) Type your program in the left window. Labels must start in the first column and operators like GET or ADD must start anywhere but the first column, i.e., there must be one or more spaces before them. The simulator does not distinguish upper case from lower case, and is not robust, so be sure to spell instructions correctly and format code carefully.

Push RUN to run your program. A dialog box will appear when a GET is executed, and output from PRINT will appear in the right window. The simulator will stop if you Cancel a GET or don't enter anything.

```
1 GET
2 PRINT
3 STOP
4
5
6
7
8
9
10
11
12
13
14
15
```

Accumulator:

Run Clear output

Syntax reminder

```
get      get a number from keyboard into accumulator
print    print contents of accumulator
```

Ex. 1: Explained

1. `_GET` -> read some number ¹
2. `_PRINT` -> print it to the output ²
3. `_STOP` -> end the program

¹ The number is store in the accumulator.

² It prints contents of the accumulator.

Notice: "`_`" shows an invisible space.

COS 109 Toy Machine Simulator - Mozilla Firefox

COS 109 Toy Machine Simulator

(You must have Javascript enabled.) Type your program in the left window. Labels must start in the first column and operators like GET or ADD must start anywhere but the first column, i.e., there must be one or more spaces before them. The simulator does not distinguish upper case from lower case, and is not robust, so be sure to spell instructions correctly and format code carefully.

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```
1  GET
2  PRINT
3  STOP
4
5
6
7
8
9
10
11
12
13
14
15
```

Accumulator:

Run Clear output

Syntax reminder

```
get    get a number from keyboard into accumulator
print  print contents of accumulator
```

Ex. 2: Run the next program and find what it does.

1. `_GET`
2. `_STORE M`
3. `_ADD M`
4. `_PRINT`
5. `_STOP`
6. `M`

Note: `STORE M` copies the value in the accumulator into a space named `M`, whereas `ADD M` adds the two values in `M` and in the accumulator and puts the result into the accumulator.

Ex. 3: Run the next program and find what it does.

1. `_GET`
2. `_STORE A`
3. `_GET`
4. `_ADD A`
5. `_PRINT`
6. `_STOP`
7. `A`

Note: `GET` reads a number into the accumulator (and overwrite the old content).

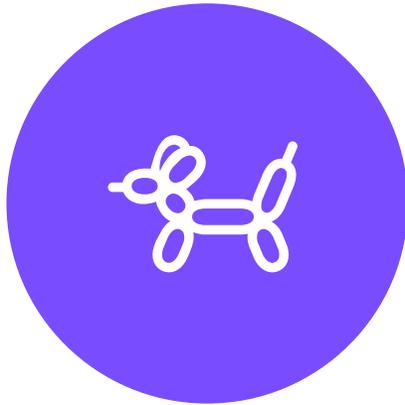
Coding task (1 point)

Write a program for the Toy Machine that **reads a number A from the user** and calculates $3 \times A$ (that is, $A + A + A$), then prints it out.

Optional task (1 bonus point)

Write a program that reads an arbitrary number A from the user, calculates and prints $100 \times A$ (100 times of A). A **smart** program is expected :-). You can try it after the lecture and submit it to me by email before Oct 19th.

Homework



WATCH TWO VIDEOS



RE-READ CHAPTER 3

YouTube -> Crash course -> Computer Science (You are not expected to understand everything)

#8 <https://www.youtube.com/watch?v=zlTgXvg6r3k> & #9 <https://www.youtube.com/watch?v=rtAIC5JIU40>



Introduction to Information Systems

- Understanding the digital world

4 Programming

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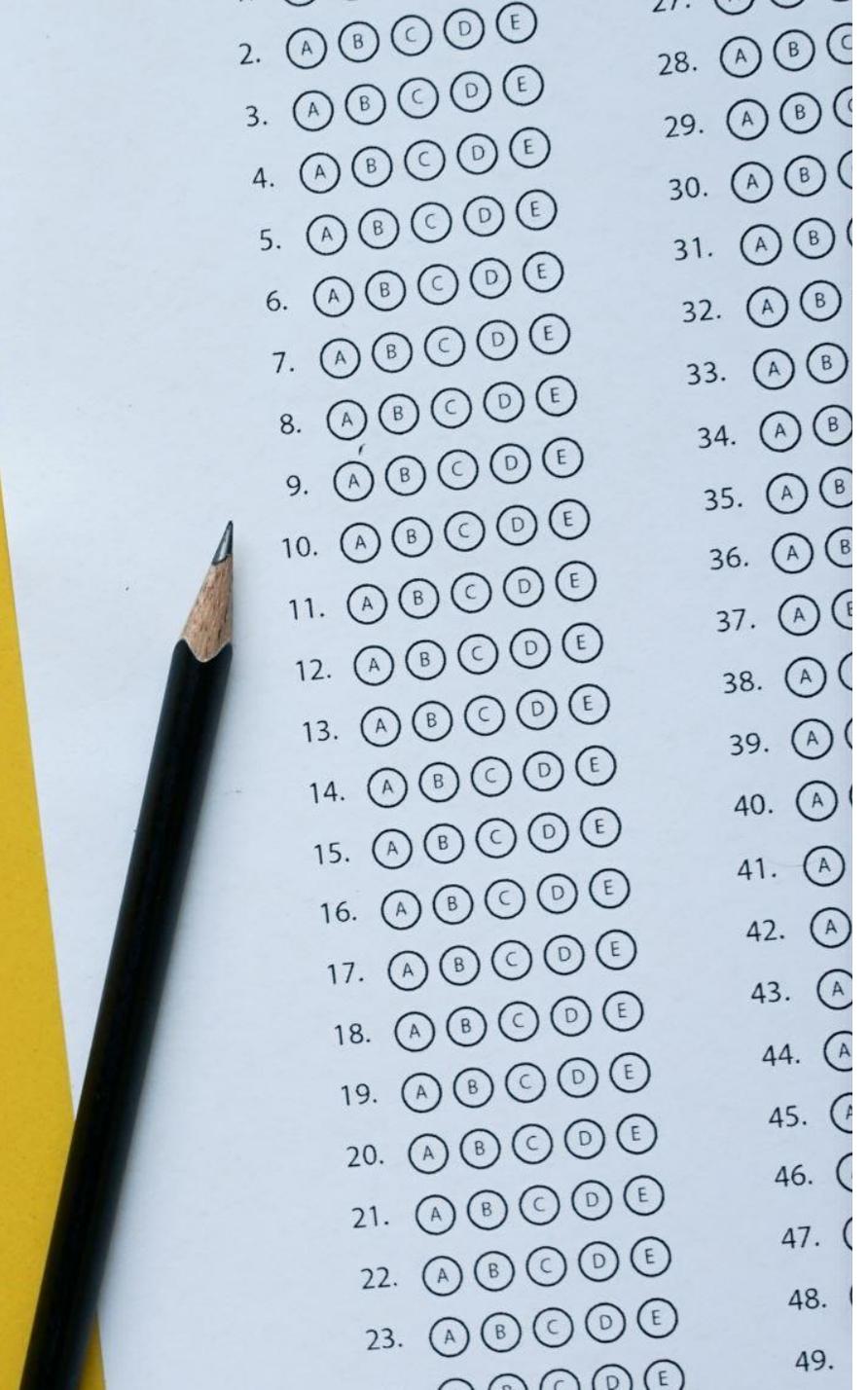


Today's schedule

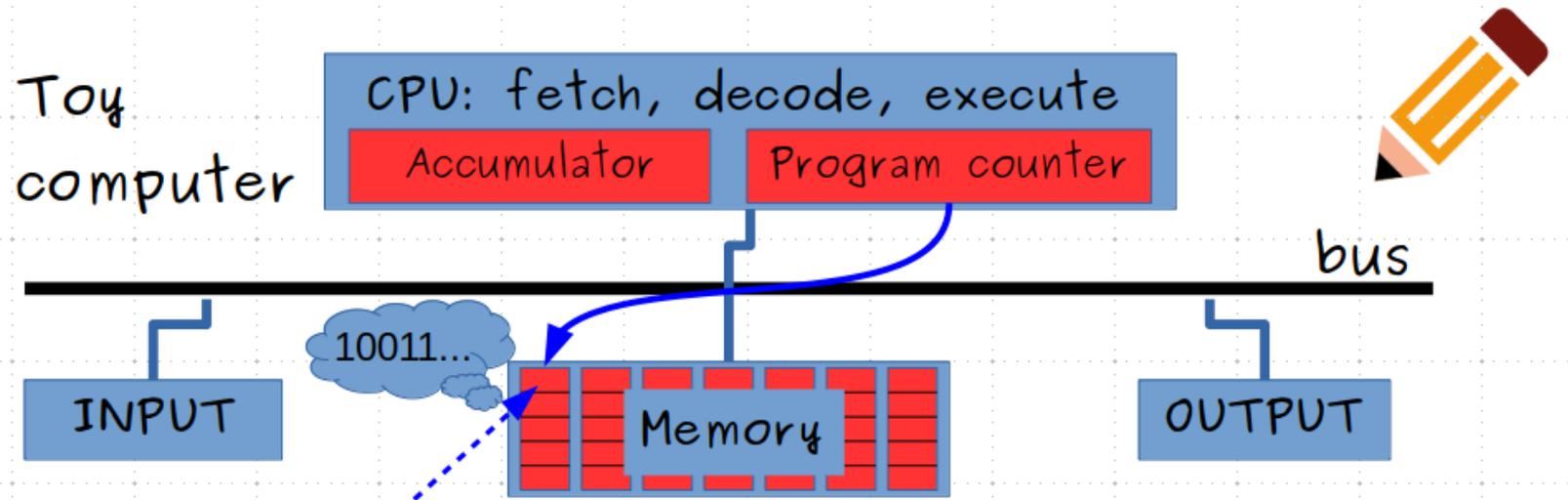
- **Review of Mini test #3 (5')**
- **Mini test #4 (15')**
- **Advanced coding with the Toy Machine (70')**

**Mini test #3 (bonus: 19, 36,
41, 50, 66, 82, 84)**

Mini test #4



Toy Machine & instructions



The programming language we are learning is called the **assembly**, which is almost the same as the machine language.

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 \geq 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

Straightforward answer to the last bonus task

Simply add A 99 times.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



_GET

_STORE A

_ADD A

...

_ADD A

_PRINT

_STOP

A



99 "ADD A"

A smart answer to the last bonus task

It uses the fact $100 = 10 \times 10$ to reduce the #additions from 99 to 18, which is 5.5 times faster than the straightforward one.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



- | | |
|---------------------------|-------------------------|
| 1. <code>_GET</code> | 11. <code>_ADD A</code> |
| 2. <code>_STORE A</code> | 12. <code>_ADD A</code> |
| 3. <code>_ADD A</code> | 13. <code>_ADD A</code> |
| 4. <code>_ADD A</code> | 14. <code>_ADD A</code> |
| 5. <code>_ADD A</code> | 15. <code>_ADD A</code> |
| 6. <code>_ADD A</code> | 16. <code>_ADD A</code> |
| 7. <code>_ADD A</code> | 17. <code>_ADD A</code> |
| 8. <code>_ADD A</code> | 18. <code>_ADD A</code> |
| 9. <code>_ADD A</code> | 19. <code>_ADD A</code> |
| 10. <code>_ADD A</code> | 20. <code>_PRINT</code> |
| 11. <code>_ADD A</code> | 21. <code>_STOP</code> |
| 12. <code>_STORE A</code> | 22. <code>A</code> |

A smarter answer to the last bonus task

It uses the fact $100 = 2 \times 2 \times 5 \times 5$ to reduce #additions to 10, which is 9.9 times faster than the straightforward one.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



1. `_GET`
2. `_STORE A`
3. `_ADD A`
4. `_STORE A`
5. `_ADD A`
6. `_STORE A`
7. `_ADD A`
8. `_ADD A`
9. `_ADD A`
10. `_ADD A`
11. `_STORE A`
12. `_ADD A`
13. `_ADD A`
14. `_ADD A`
15. `_ADD A`
16. `_PRINT`
17. `_STOP`
18. `A`

Another answer to the last bonus task

It uses the fact $100 = 3 \times 32 + 4$ to reduce #additions to 8, which is 12.4 times faster than the straightforward one.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



Other answers:

$100 = 5 \times 5 \times 4$ (#additions = 11)

$100 = 64 + 32 + 4$ (#additions = 8)

- | | |
|---------------------------|---------------------------|
| 1. <code>_GET</code> | 11. <code>_ADD C</code> |
| 2. <code>_STORE A</code> | 12. <code>_STORE B</code> |
| 3. <code>_ADD A</code> | 13. <code>_ADD B</code> |
| 4. <code>_STORE B</code> | 14. <code>_ADD B</code> |
| 5. <code>_ADD B</code> | 15. <code>_ADD A</code> |
| 6. <code>_STORE A</code> | 16. <code>_PRINT</code> |
| 7. <code>_ADD A</code> | 17. <code>_STOP</code> |
| 8. <code>_STORE B</code> | 18. <code>A</code> |
| 9. <code>_ADD B</code> | 19. <code>B</code> |
| 10. <code>_STORE C</code> | 20. <code>C</code> |

This kind of approach is smart but tricky and limited.
The universal way is to use the “loop” structure.

Loop: repeat a task

A loop consists of a **label** and a **jump**.

IFZERO E: Jump to label E if the accumulator is 0.

GOTO L: Jump to label L (unconditionally).

SUB A: Subtract A from the accumulator

1. L_GET
2. _SUB A
3. _IFZERO E
4. _GOTO L
5. E_STOP
6. A_2023

This one serves as a simple password checking program.

Another loop example

LOAD A: Load the content of A into the accumulator.

ADD 1: Add 1 to the accumulator.

For better understanding, **use the single-step version** of the toy machine.

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toystep.html>



1. L_GET
2. _IFZERO E
3. _LOAD A
4. _ADD 1
5. _PRINT
6. _STORE A
7. _GOTO L
8. E_STOP
9. A_0

Input 0 to end it.

Solve the last bonus task with loop

This is the **universal** way to handle a loop with **any** number of repetition (e.g., 47, 739, or a number input by the user).

Notice that it is not fast – the number of additions is the same as the naïve one.

1. `_GET`
2. `_STORE A`
3. `L_LOAD N`
4. `_IFZERO E`
5. `_SUB 1`
6. `_STORE N`
7. `_LOAD S`
8. `_ADD A`
9. `_STORE S`
10. `_GOTO L`
11. `E_LOAD S`
12. `_PRINT`
13. `_STOP`
14. `A`
15. `S_0`
16. `N_100`

Ex. 1: Calculate a sum

This program calculates $1 + 2 + \dots + 100$.
Consider how it can do that, then modify it to
calculate $1 + 2 + \dots + 1000$ please.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



1. L_LOAD N
2. _IFZERO E
3. _ADD S
4. _STORE S
5. _LOAD N
6. _SUB 1
7. _STORE N
8. _GOTO L
9. E_LOAD S
10. _PRINT
11. _STOP
12. N 100
13. S 0

Ex. 2: Print a triangle

This program prints a triangle with a given height. Why? Confirm it with the toy machine.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



1. `_GET`
2. `_STORE N`
3. `L_LOAD N`
4. `_IFZERO E`
5. `_LOAD A`
6. `_PRINT`
7. `_ADD A`
8. `_ADD A`
9. `_ADD A`
10. `_ADD A`
11. `_STORE A`
12. `_ADD A`
13. `_ADD 8`
14. `_STORE A`
15. `_LOAD N`
16. `_SUB 1`
17. `_STORE N`
18. `_GOTO L`
19. `E_STOP`
20. `A_8`
21. `N`

Summary

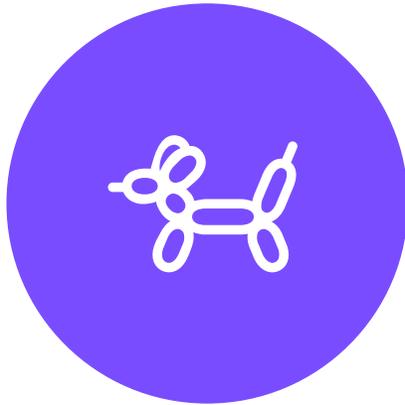
Three basic structures of a program

- **Sequence (run code one by one)**
- **Conditional jump (a.k.a. selection)**
- **Loop**

Any program can be decomposed to a combination of these three basic structures.



Homework



WATCH THREE VIDEOS

YouTube -> Crash course -> Computer Science -> #11, #12, and #13
(You are not expected to understand everything)



READ CHAPTERS 4 & 5



Introduction to Information Systems - Understanding the digital world

5 Algorithms, Programming and Programming
languages

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ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- **Answers to the coding tasks (15')**
- **Mini test #5 (10')**
- **Algorithms & Programming (20')**
- **Programming languages (45')**

Last coding task 1

This program calculates $1 + 2 + \dots + N$ for a number **N given by the user**.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



1. **_GET**
2. **_STORE N**
3. **L_LOAD N**
4. **_IFZERO E**
5. **_ADD S**
6. **_STORE S**
7. **_LOAD N**
8. **_SUB 1**
9. **_STORE N**
10. **_GOTO L**
11. **E_LOAD S**
12. **_PRINT**
13. **_STOP**
14. **N**
15. **S 0**

Last coding task 2

Write a program that prints 1, 2, ..., 99 **in that order** with loop: a smart answer by students.

Toy Machine Simulator ->

<http://www.cs.princeton.edu/courses/archive/fall18/cos109/toysim.html>



1. L_load a
2. _add 1
3. _store a
4. _print
5. _sub 99
6. _ifzero b
7. _goto L
8. b stop
9. a 0

Algorithm is the abstract procedure to solve a task

The efficiency of a program depends on the algorithm.

Only 17 operations

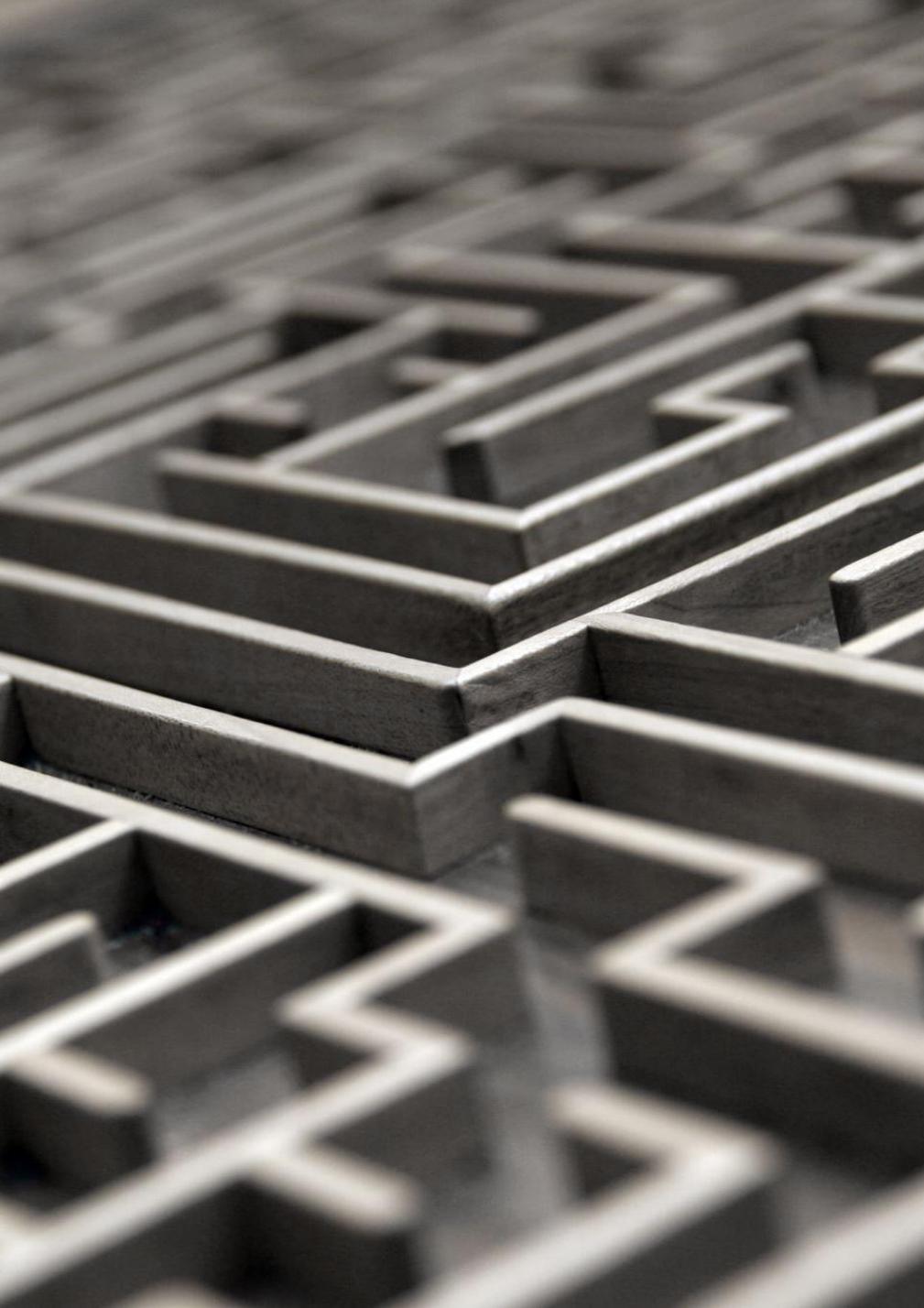
```
  _GET  
  _STORE A  
  _ADD A  
  {  
  _...  
  _ADD A  
  }  
  _PRINT  
  _STOP  
  A
```

99 times

> 100 operations

```
1.  _GET      9.  STORE S  
2.  _STORE A 10.  _GOTO L  
3.  L_LOAD N 11.  E_LOAD S  
4.  _IFZERO E 12.  _PRINT  
5.  _SUB 1   13.  _STOP  
6.  _STORE N 14.  A  
7.  _LOAD S  15.  S_0  
8.  _ADD A   16.  N_100
```

```
1.  _GET      10.  _ADD A  
2.  _STORE A  11.  _STORE A  
3.  _ADD A    12.  _ADD A  
4.  _STORE A  13.  _ADD A  
5.  _ADD A    14.  _ADD A  
6.  _STORE A  15.  _ADD A  
7.  _ADD A    16.  _PRINT  
8.  _ADD A    17.  _STOP  
9.  _ADD A    18.  A
```



Hard problems and complexity

- **Complexity** is how difficult an algorithm is. It is evaluated by the **#steps** and **#memory** used.
- <https://www.youtube.com/watch?v=Q4gTV4rDzRs>
(See HOW HARD a hard problem can be. It is in Japanese with English subtitles. About 8 minutes)

```
object to mirror_
mirror_mod.mirror_object
operation == "MIRROR_X":
mirror_mod.use_x = True
mirror_mod.use_y = False
mirror_mod.use_z = False
operation == "MIRROR_Y":
mirror_mod.use_x = False
mirror_mod.use_y = True
mirror_mod.use_z = False
operation == "MIRROR_Z":
mirror_mod.use_x = False
mirror_mod.use_y = False
mirror_mod.use_z = True

#selection at the end -add
mirror_ob.select= 1
modifier_ob.select=1
context.scene.objects.active
("Selected" + str(modifier_ob
mirror_ob.select = 0
= bpy.context.selected_objects
data.objects[one.name].select
print("please select exactly
```

Program

- A collection of instructions to **implement** an algorithm.
- There exist many dialects, called **programming languages**.
- The one we learned is **assembly**. There are > 200 languages.

Three fundamental structures of ALL programs (algorithms).

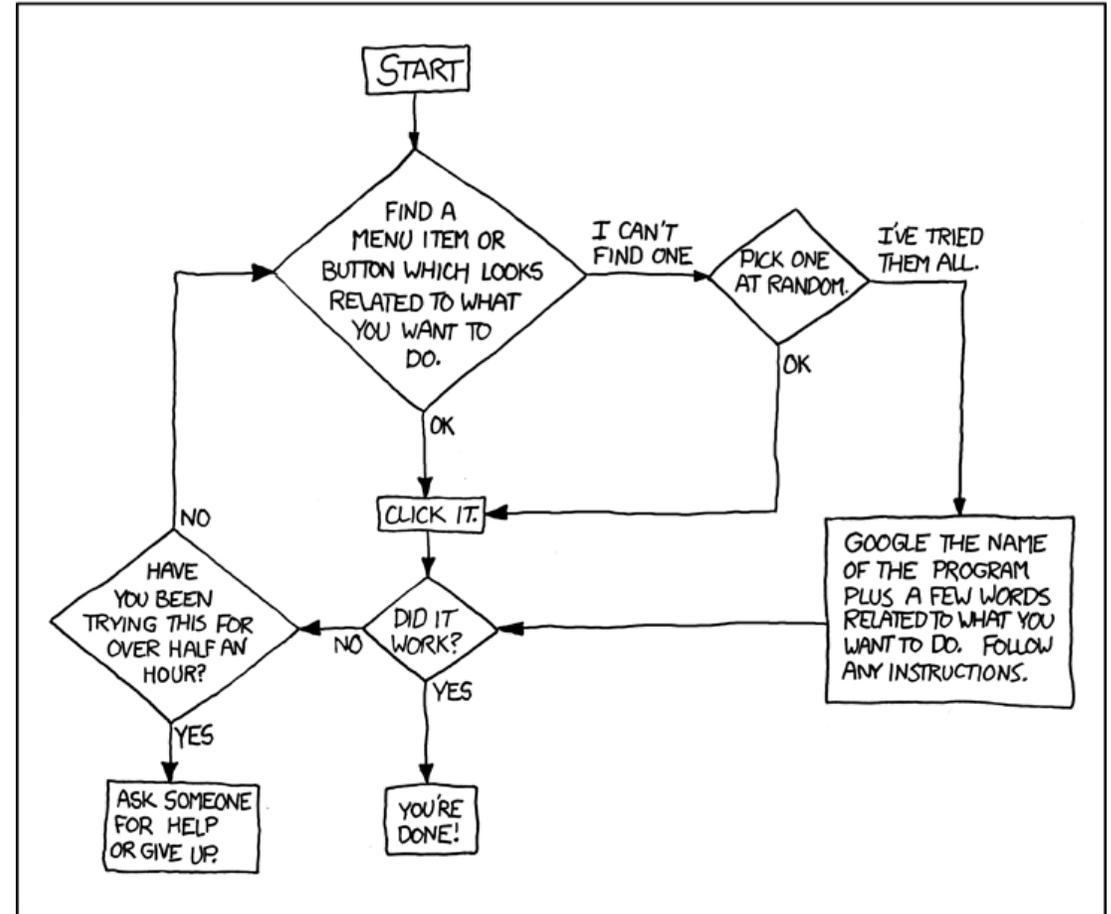
1. Sequential

2. Conditional

3. Iterative (-> loop)

DEAR VARIOUS PARENTS, GRANDPARENTS, CO-WORKERS,
AND OTHER "NOT COMPUTER PEOPLE."

WE DON'T MAGICALLY KNOW HOW TO DO EVERYTHING IN EVERY
PROGRAM. WHEN WE HELP YOU, WE'RE USUALLY JUST DOING THIS:



PLEASE PRINT THIS FLOWCHART OUT AND TAPE IT NEAR YOUR SCREEN.
CONGRATULATIONS; YOU'RE NOW THE LOCAL COMPUTER EXPERT!

Python: a high-level programming language



1. A Python program to calculate $1 + 2 + \dots + N$ for a number N input by the user.
2. A Python program to print 1, 2, ..., 99 in that order with loop.

Program 1

1. `n = int(input())`
2. `s = 0`
3. `for i in range(1, n+1):`
4. `s = s + i`
5. `print(s)`

Note: use 4 spaces " " for the indent.

Program 2

1. `for i in range(100):`
2. `print(i)`

<https://paiza.io/en/projects/new?language=python3>

1. Put the code into the code window (skip # lines).
2. Put the input in the "Input" window.
3. Click the "Run (Ctrl+Enter)" button to execute.

Scratch (yet another programming language)

1. Go to <https://scratch.mit.edu>
2. "Start Creating" -> "Tutorials"
3. Open the next sample (click flag -> start, click cat -> stop)

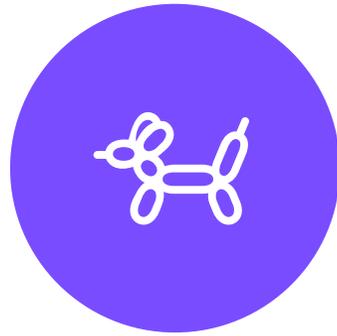


<https://scratch.mit.edu/projects/750318208/>



Click "See inside" to investigate the code. Modify the program so that the cat runs faster, or slower, or says something different, or does something different, etc. Notice how the three fundamental structures are implemented in Scratch.

Homework



WATCH VIDEOS

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



READ THE TEXTBOOK

IF YOU HAVE NOT



Introduction to Information Systems - Understanding the digital world

6 Programming with Python and Scratch

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- **Review of Mini test #5 (5')**
- **Programming & Python (15')**
- **Scratch advanced (60')**
- **Information & homework (10')**

Programming & Python (flavor only)



<https://www.youtube.com/watch?v=hb7Q33ysCwl> (Coding is not difficult, 7')



<https://www.youtube.com/watch?v=l2wURDqiXdM> (Learn Python in 5 minutes, 7')



This lecture is just an introduction. If you are interested, there are many free online courses available.

Game developing with Scratch

1. Create an account on Scratch (see <https://www.youtube.com/watch?v=se8di8cBj70>).
2. Watch a tutorial <https://www.youtube.com/watch?v=1jHvXakt1qw>.
3. With your account, first create the same game as introduced in the above tutorial.
4. Then create your original game and try to make it as fun as possible (in your opinion).
5. **Share the project by click the "Share" button.**
6. E-mail me the link of your game to liangzhao@acm.org before 9am, Nov. 7th. TA and I will grade it based on our impression (the final grade is the average of the reviewers).

Homework

Complete

- the Scratch game, share it, and send me the link.

Read

- Chapter 6 of the textbook

Information on the class survey

- Your feedback is important to help me know what you think about the course so that I can improve it in the following classes. You may provide feedback with the mini tests.



Introduction to Information Systems - Understanding the digital world

7 Operating System and Software Systems

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025

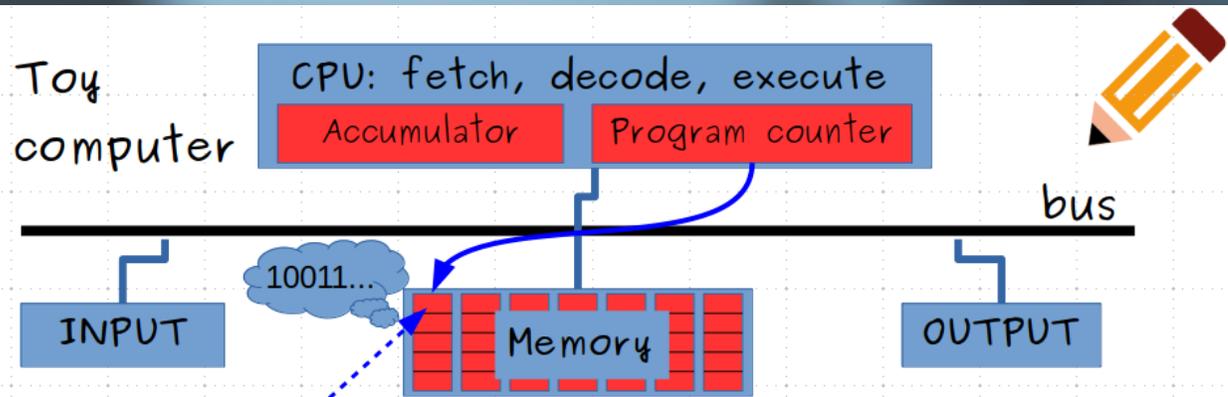




Today's schedule

- **Review of the Scratch game (5')**
- **BIOS (5')**
- **Operating System & Software (60')**
- **Information and homework (5')**
- **Mini test (15')**

Some of my favorite submissions (TBA)



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 \geq 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**

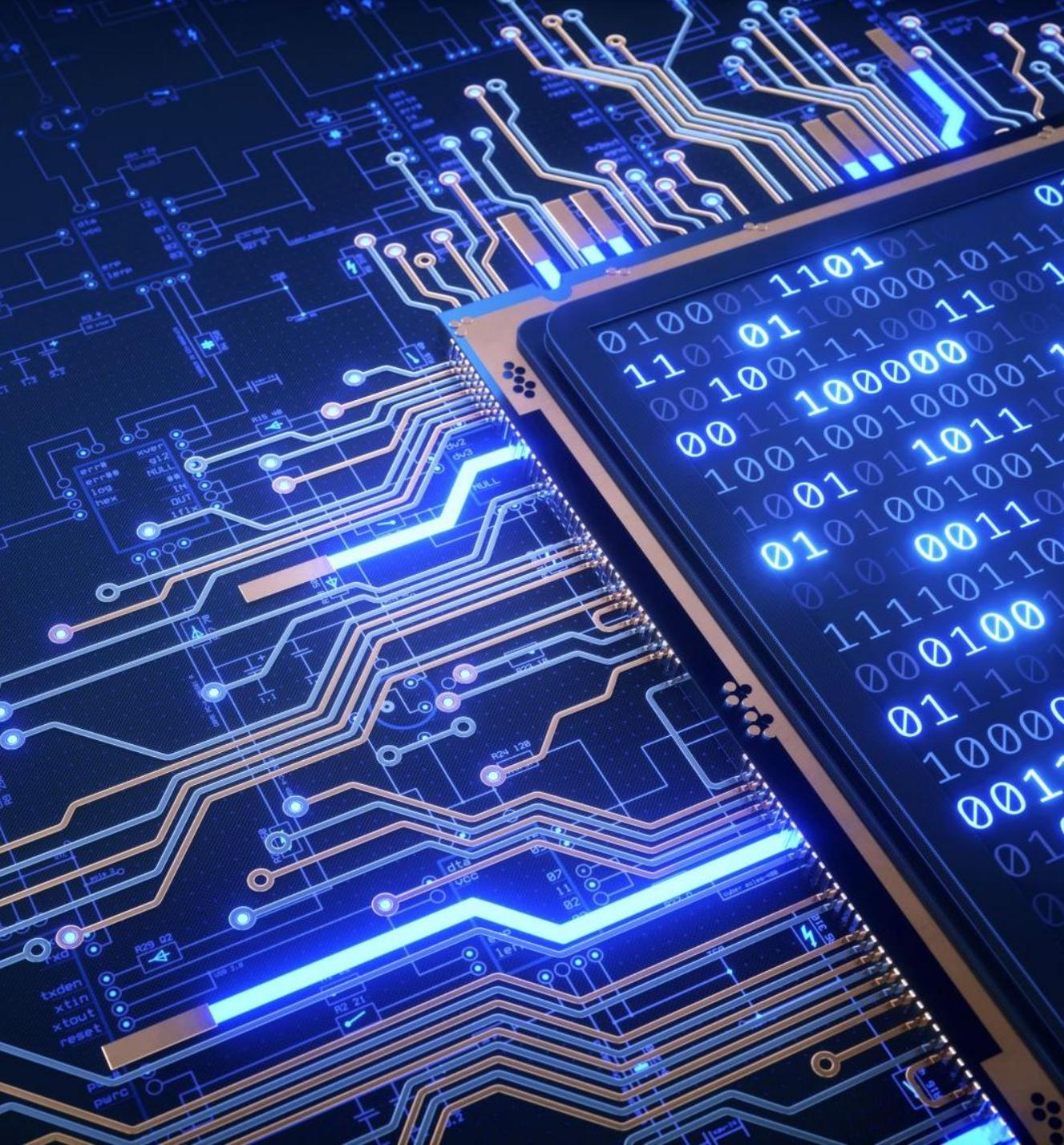
RAM (memory)

**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`

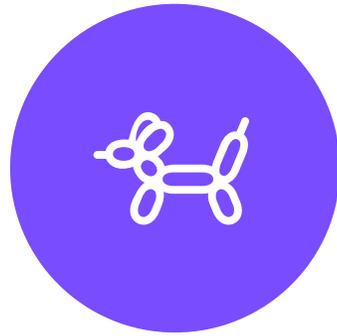
Shell

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.

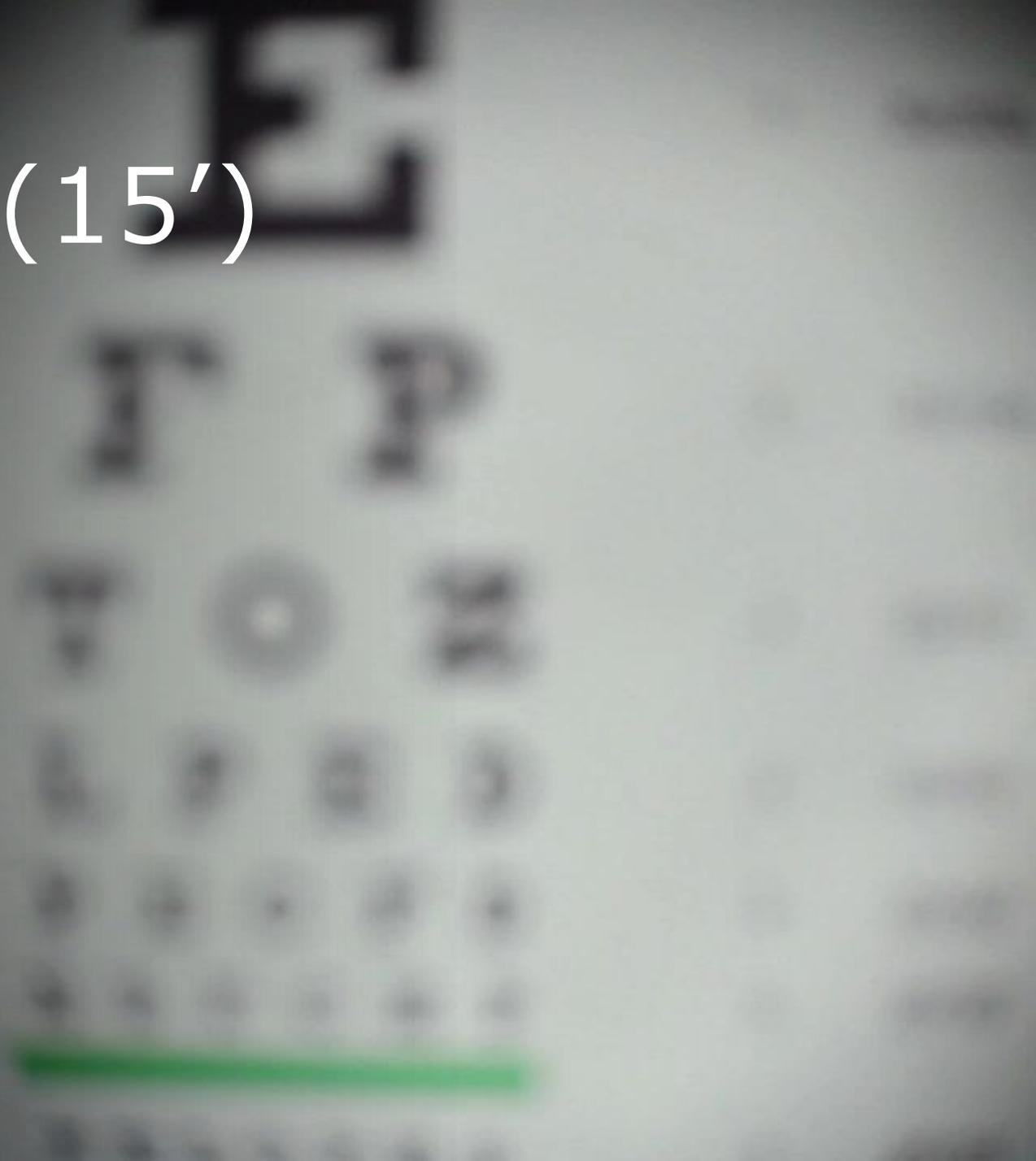


Memory management: Crash Course -> Computer Science #19
<https://www.youtube.com/watch?v=TQCr9RV7twk>



Other Uses: Linux, FreeBSD, Android, etc

Mini test (15')





Introduction to Information Systems

- Understanding the digital world

8 Javascript and HTML (Do Week)

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025



Schedule

Schedule: **1** What is in a Computer, **2** Bit, Bytes and Representation of Information, **3** Inside the CPU, **4** Programming, **5** Algorithms, Programming and Programming Languages, **6** Programming with Python and Scratch, **7** Operating System and Software Systems, **8 Javascript and HTML**, **9 Communication and Networks**, **10 The Internet**, **11 Data and Information**, **12 Privacy and Security**, **13 The World-Wide Web (WWW), HTML, and Wiki**, **14 Artificial Intelligence (AI) and the Future of Computing**, **15 The Future of Information System and Overall Review**



Today's schedule

- **HTML Introduction (35')**
- **Javascript (50')**
- **Information and homework (5')**

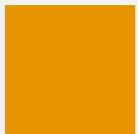
HTML Introduction



<https://www.w3schools.com/videos/index.php> (5')



https://www.w3schools.com/html/html_intro.asp -> HOME,
Introduction, Editors, Basic (25')



Try the online editor (5'):

https://www.w3schools.com/html/tryit.asp?filename=tryhtml_intro

Javascript Introduction



https://www.youtube.com/watch?v=Ukg_U3CnJWI (12')

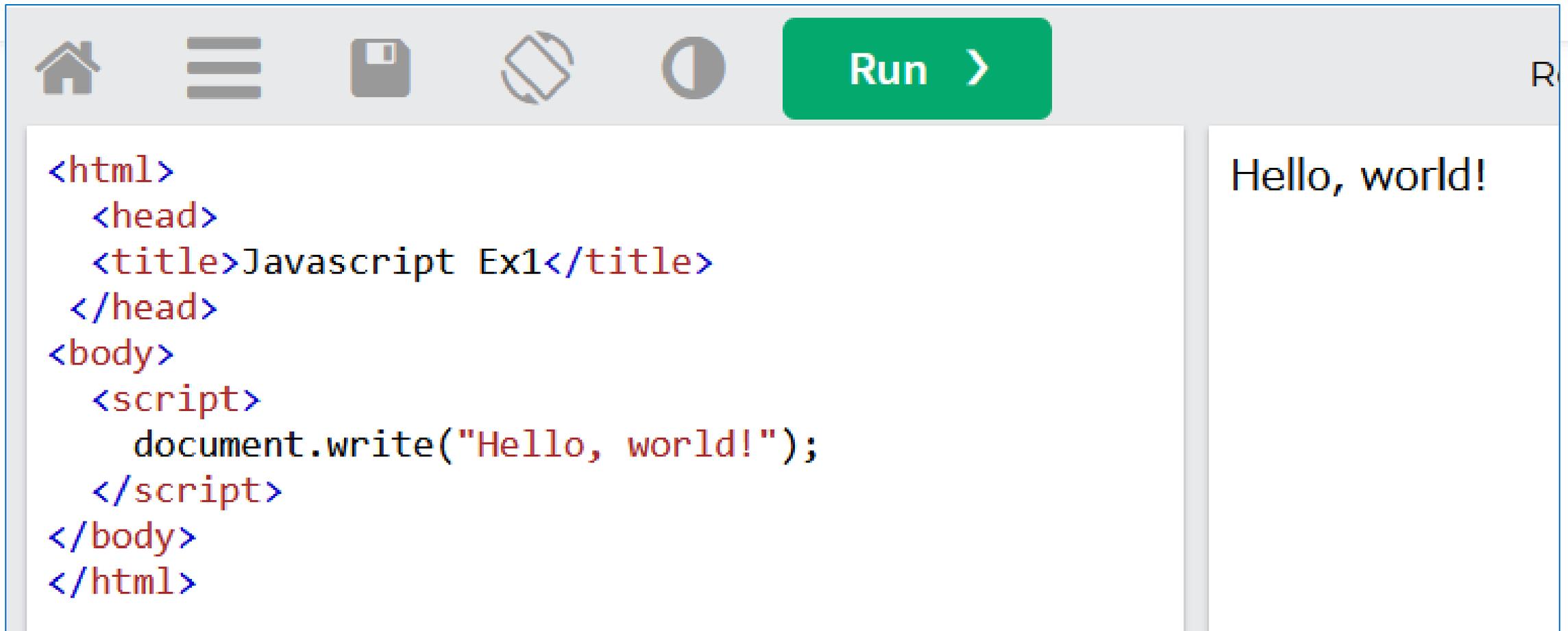
Javascript exercise: hello

```
<html>
  <body>
    <script>
      alert("Hello, world." );
    </script>
  </body>
</html>
```



Access https://www.w3schools.com/js/tryit.asp?filename=tryjs_myfirst. Clear the existing code and input the above code in the left windows. Then run it by clicking the "Run >" button.

ex1

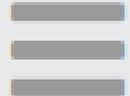


The image shows a code editor interface with a toolbar at the top. The toolbar includes icons for home, menu, save, refresh, and a green 'Run' button with a right-pointing arrow. Below the toolbar, the code editor displays the following HTML and JavaScript code:

```
<html>
  <head>
    <title>Javascript Ex1</title>
  </head>
  <body>
    <script>
      document.write("Hello, world!");
    </script>
  </body>
</html>
```

To the right of the code editor, the output area displays the text "Hello, world!".

ex2



Run >

```
<html>
  <head><title>Javascript Ex2</title></head>
<body>
  <script>
    var name = prompt("What is your name?");
    var sentence = "Hello, " + name + ".";
    document.write(sentence);
  </script>
</body>
</html>
```

Hello, Z.

ex3

```

<html>
  <head><title>Javascript Ex3</title></head>
<body>
  <script>
    n = prompt("Enter a number please:");
    for (i=1; i<=n; i=i+1) {
      for (j=1; j<=i; j=j+1) { document.write("*"); }
      document.write("<br>");
    }
  </script>
</body>
</html>

```

Run >

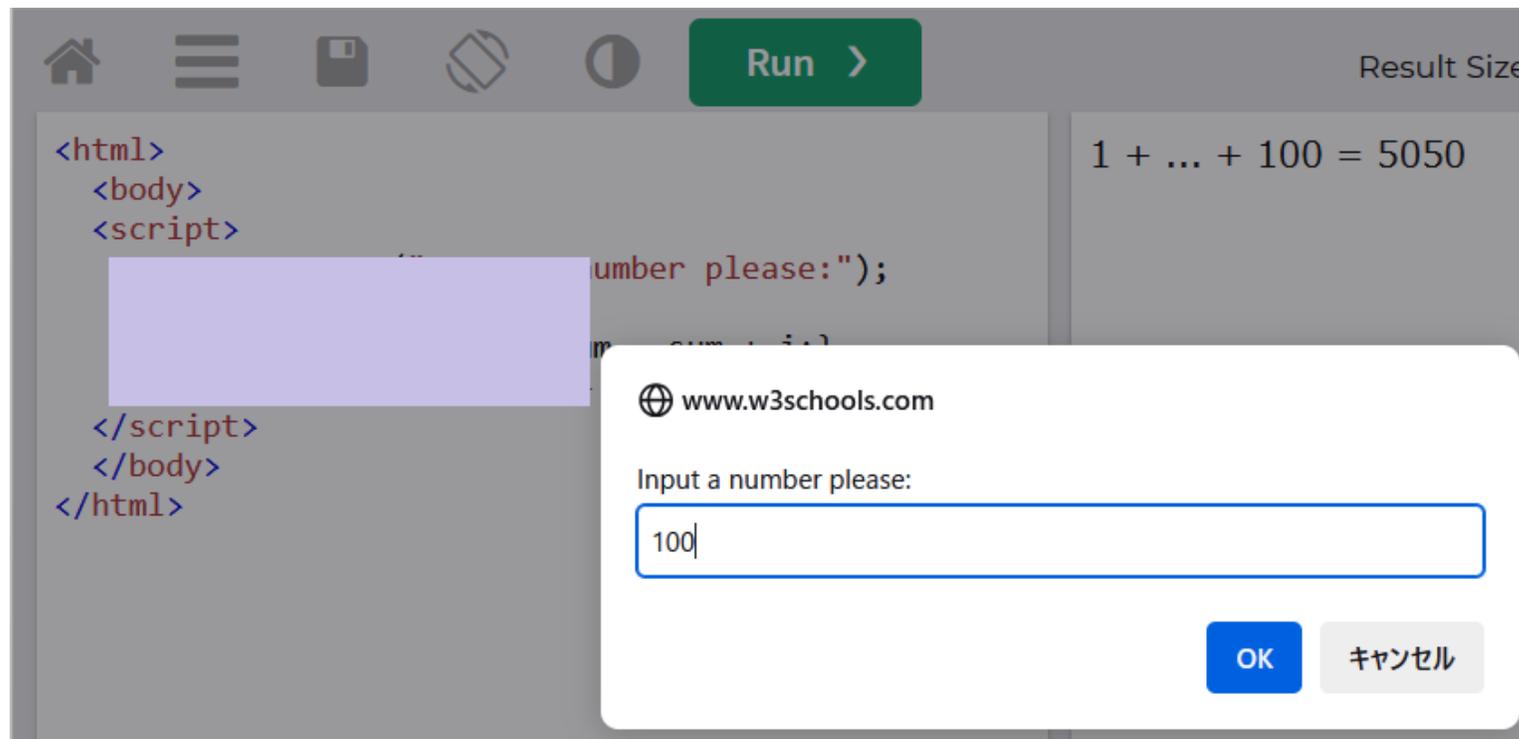
```

*
**
***
****
*****
*****
*****
*****
*****
*****
*****

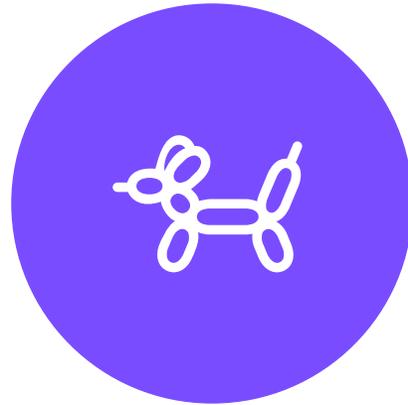
```

Classwork (ex4)

Write a javascript program that reads an integer N from the user, calculates $1 + 2 + \dots + N$, and outputs the result (see the next screenshot for a hint).



Information and homework



NONE



Introduction to Information Systems

- Understanding the digital world

9 Communication and Networks

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- Do week explanation (5')
- Review of the scratch game (5')
- A suggestion on learning (5')
- Intro to telecommunication (20')
- Computer networks (15')
- Mini test #9 and grading (35')
- Information and homework (5')

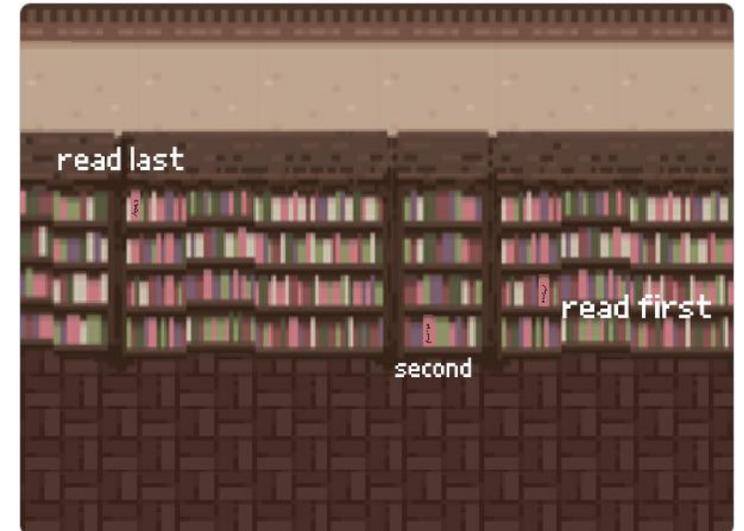
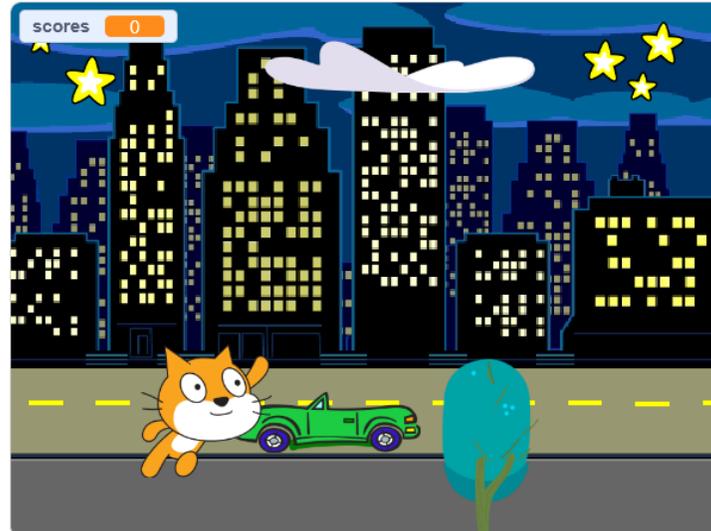
Do week: Javascript and HTML (5')

1. Goto <https://aw.gsais.kyoto-u.ac.jp/liang/lectures>
2. Watch the instruction video with the slide file.
3. Try the first four exercises.
4. Finish the classwork.
5. Complete the mini test #8 and submit at the next lecture.



On the scratch game (5')

Some of my favorite submissions



A suggestion on learning (5')

- As the proverb "Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime." says, **this course aims to help you learn how to *fish*.**

Skill	Fish (instant temporary aid)	Learn to fish (time consuming but for self-sufficiency)
Quantitative thinking	Calculator	Learn Math
Information processing	ChatGPT, Gemini, Copy, or anything that provides instant knowledge.	Search, Read, Listen, Think, Practice, etc., with more info processing activities by brain.



Introduction to telecommunication

- Tin can telephone (8')
- Morse code:
https://www.youtube.com/watch?v=iy8BaMs_Jul (4')
- Codes for text message (ASCII etc), for emoji (UTF-8 etc), for video message (H264 etc)

More on Morse code

- Source: [dailymail.co.uk](https://www.dailymail.co.uk)
- Cheating with Morse code is Okay only in this course.

Writing answers on a tampon and using **MORSE CODE**: The most bizarre (and ingenious) ways British students have cheated on their exams revealed

- One in ten students admit to having cheated on a test, finds a new survey
- Ploys include using UV pens to write 'invisible' answers on arm
- One student wrote notes on her fingers and concealed them with rings

By [ANNABEL FENWICK ELLIOTT FOR MAILONLINE](#)

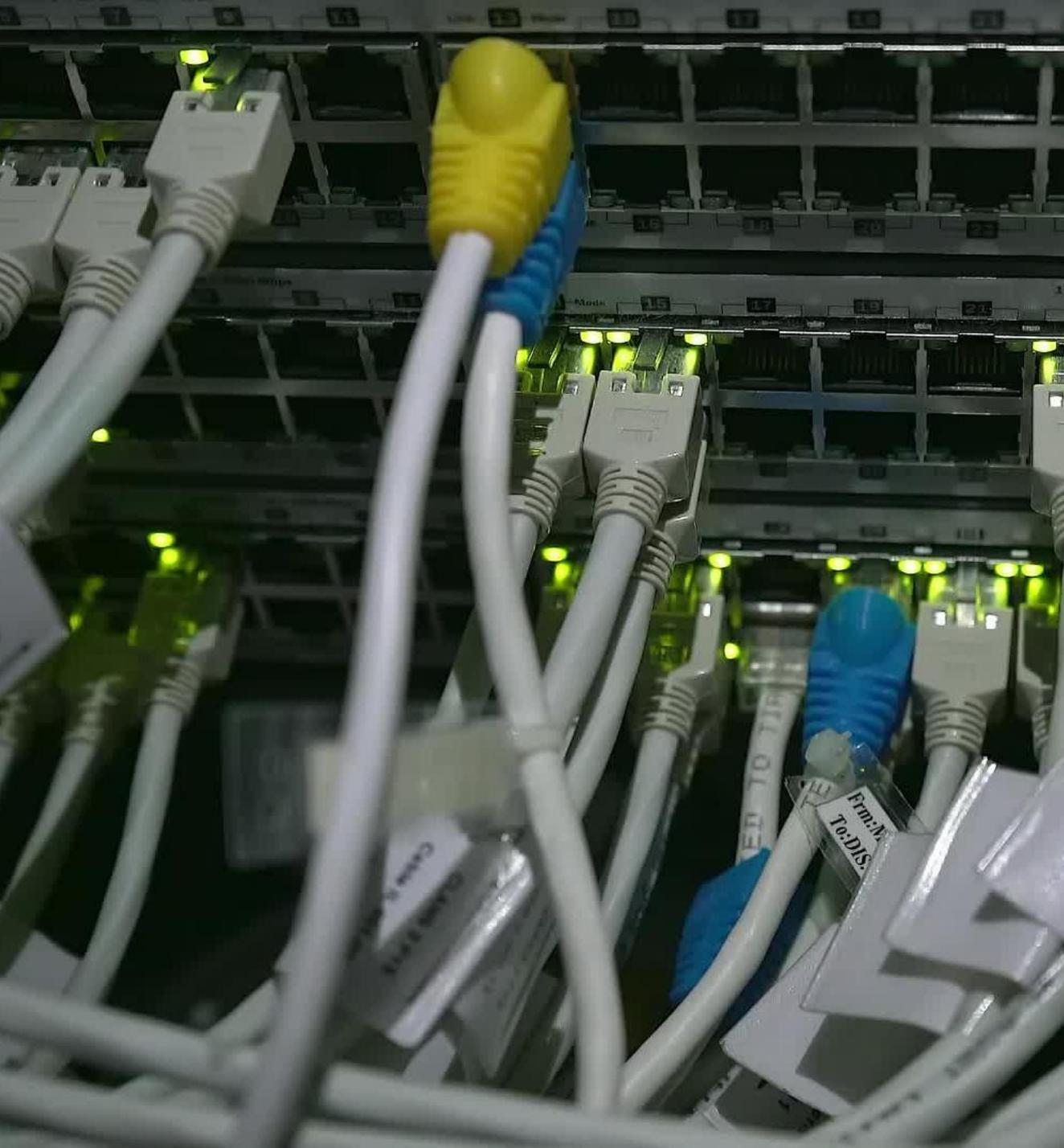
PUBLISHED: 18:57 GMT, 24 June 2015 | UPDATED: 22:34 GMT, 24 June 2015

EXCLUSIVE: Morse Code is making a comeback! Children as young as FIVE are learning the once groundbreaking form of communication - spurred on by K-Pop bands who use it to leak hints about upcoming songs to fans

- More and more young people around the world are opting to learn Morse Code
- Several K-Pop bands use it in their videos to provide hints about upcoming songs
- **EXCLUSIVE:** MailOnline speaks to people teaching Morse Code to others

By [EIRIAN JANE PROSSER FOR MAILONLINE](#)

PUBLISHED: 14:28 GMT, 26 January 2023 | UPDATED: 14:07 GMT, 30 January 2023



Computer networks

- Youtube -> Crash course, Computer networks (15')
<https://www.youtube.com/watch?v=3QhU9jd03a0>

Mini test (20')

International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.

A ● —
B — ● ● ●
C — ● — ●
D — ● ●
E ●
F ● ● — ●
G — — ●
H ● ● ● ●
I ● ●
J ● — — —
K — ● —
L ● — ● ●
M — —
N — ●
O — — —
P ● — — ●
Q — — ● —
R ● — ●
S ● ● ●
T —

U ● ● —
V ● ● ● —
W ● — —
X — ● ● —
Y — ● — —
Z — — ● ●

1 ● — — — —
2 ● ● — — —
3 ● ● ● — —
4 ● ● ● ● —
5 ● ● ● ● ●
6 — ● ● ● ●
7 — — ● ● ●
8 — — — ● ●
9 — — — — ●
0 — — — — —



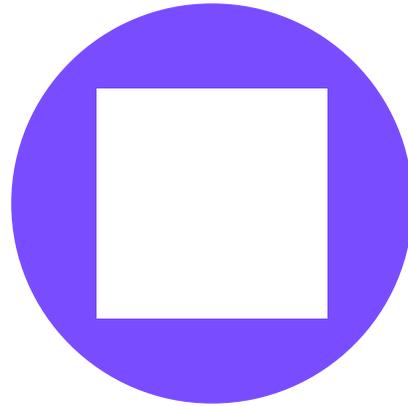


Grading (15')

- **Work in pair to translate the Morse code of your peer. You can use the next machine translator.**
- **<https://morsecode.world/international/translator.html>**

Information and homework

**You are welcome
to feedback your
interests/options
- I read them.**



READ CHAPTER 8.



Introduction to Information Systems

- Understanding the digital world

10 The Internet

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- Review
- How does the Internet work
- Safe message transmission
- A three-way solution
- Classwork and mini test #10
- Information and homework

About your performance so far

Today's email: "Hello Mr./Ms. NAME, this email is to inform that your grade so far (except for #8) is VALUE in total. (Comments to Scratch game)"

Sorry for the confusing expression. Here "grade" should be "points" (obtained).

Evaluation Criteria: Each lecture has 7pt (2 for attendance and 5 for mini test). The total is thus 7pt x 15 lectures = 105pt with a max of 100pt. **Bonus** points are given to **challenging** tasks. **General note:** Attendance is evaluated by if the student followed the instructions, while assignment (mini test) is evaluated by the correctness or completeness of the answer.

**Top 3
proverbs used
in mini test #9
last year**

**#1 "Better late than never." – 10
times**

**#2 "Kill two birds with one stone."
– 3 times**

#3 "No pain, no gain." – twice

**Top 3
proverbs used
in mini test #9
this year**

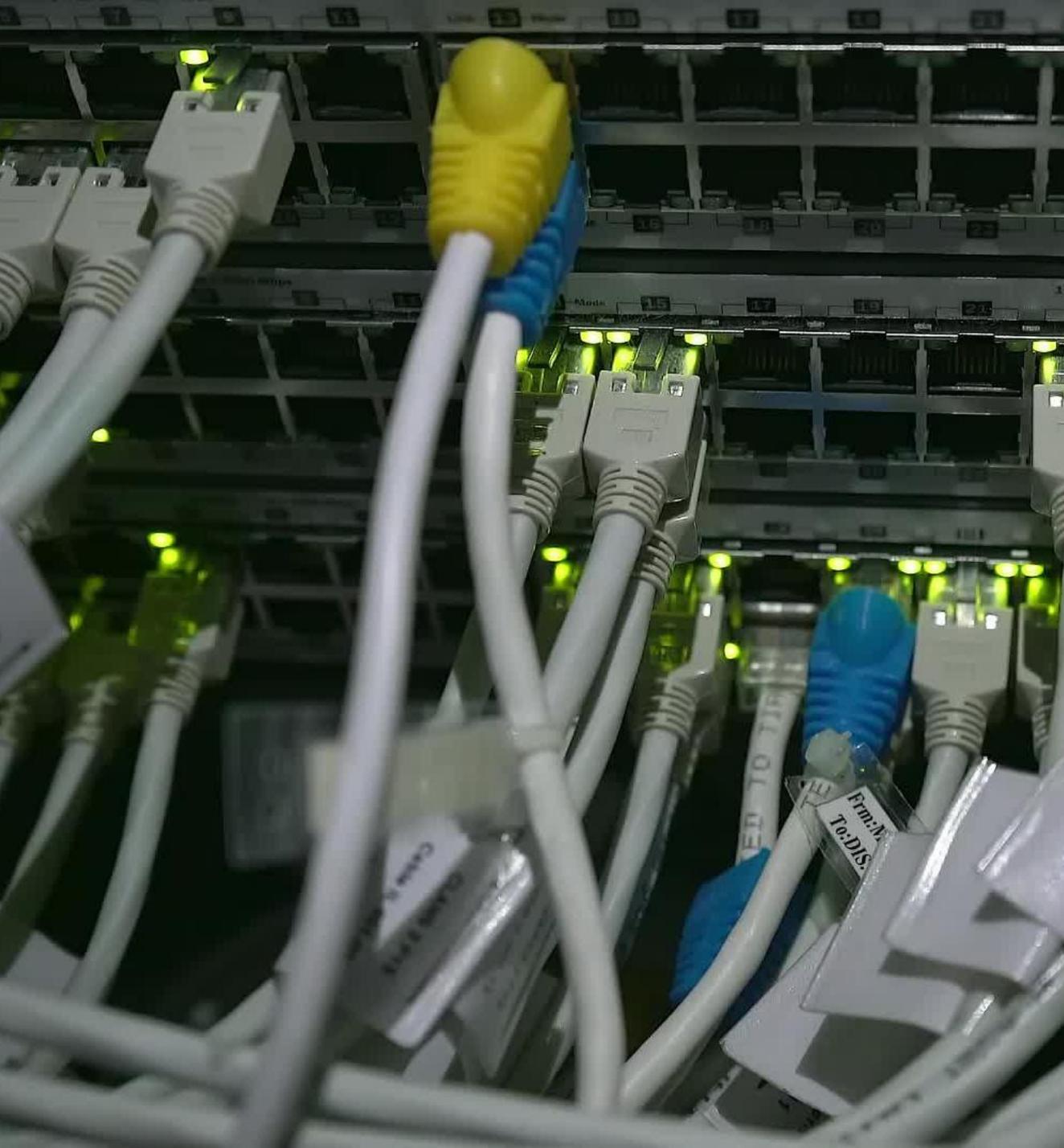
**#1 "Better late than never" – 5
times**

**#2 "Practice makes perfect" – 4
times**

**#3 "Honesty is the best policy" –
twice**

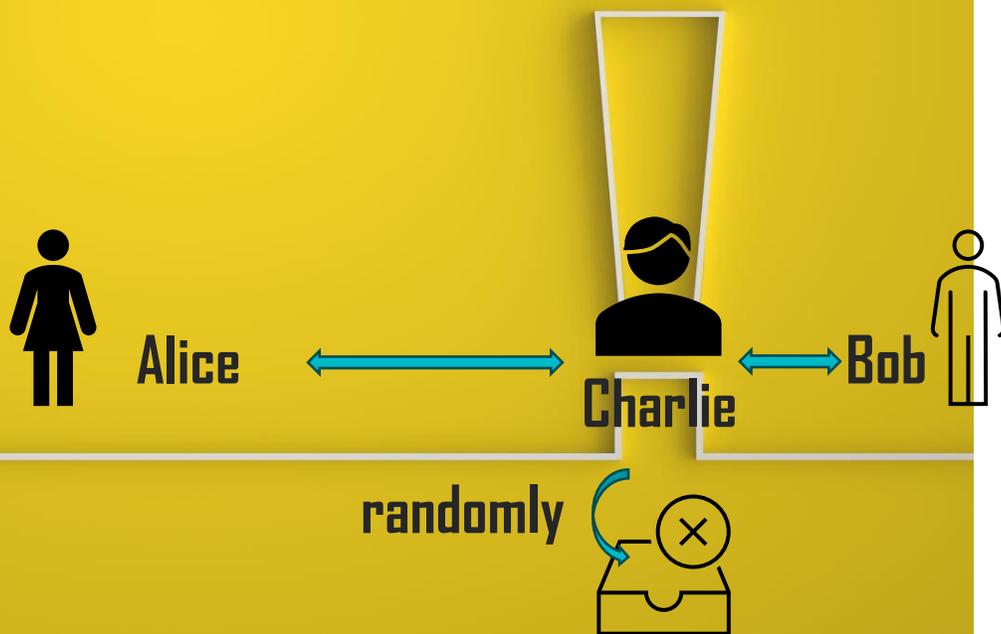
**#3 "Rome was not built in a day" –
twice**

**#3 "Action speaks louder than
words" – twice**



How the Internet works

- <https://www.youtube.com/watch?v=Sfzo4xm5eX8> (4 min)
- <https://www.youtube.com/watch?v=sMHzfigUxz4> (10 min)
- https://www.youtube.com/watch?v=ewrBaIT_eBM (4 min)



Build safe message transmission (20')

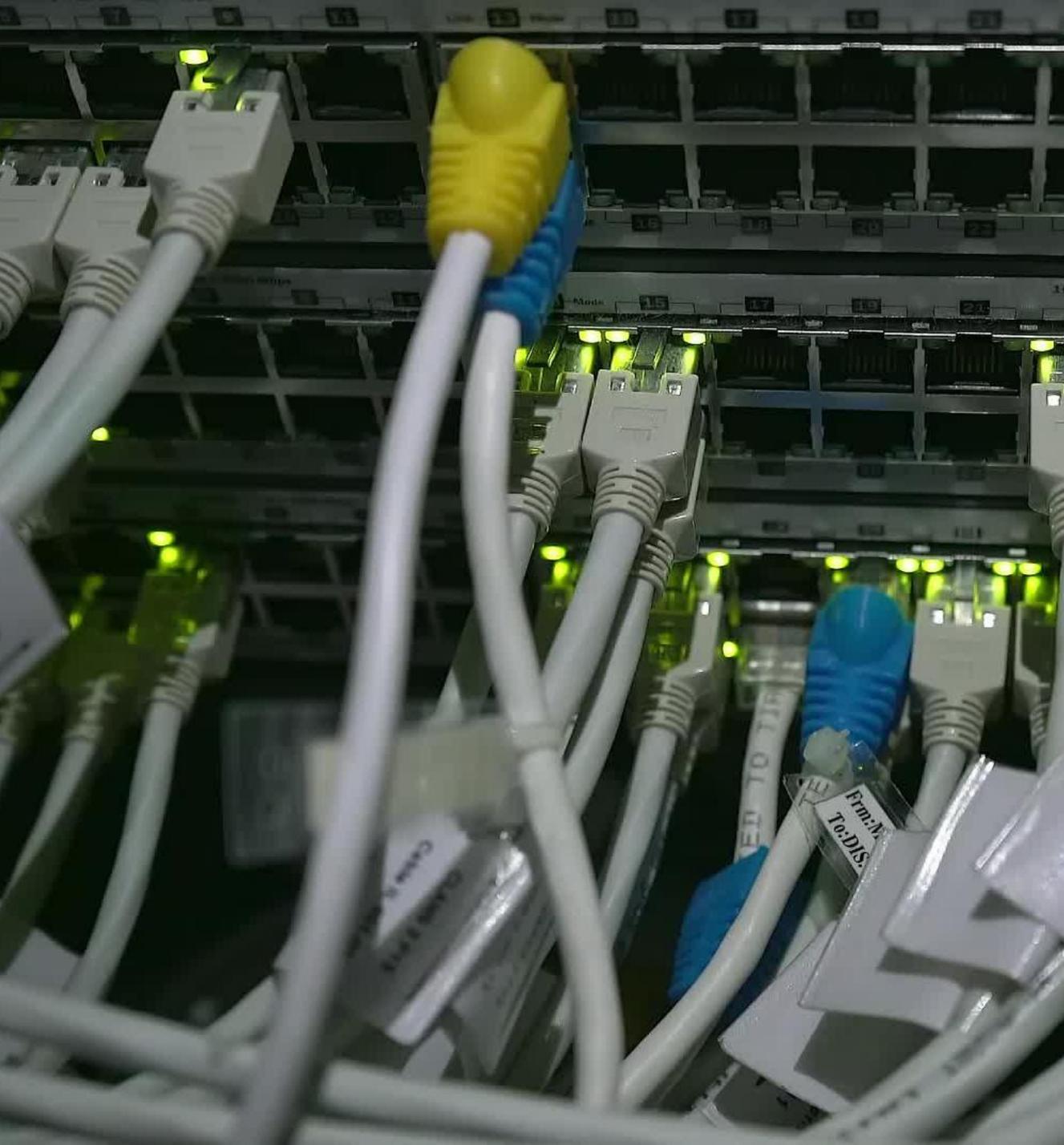
Players: Alice, Bob, and Charlie

Rules

1. A (resp. B) can send messages to B (resp. A) only via C.
2. C may drop the message randomly with no notification to the sender.

Task

- B wants to have a dinner with A on Saturday. How can he make it?



**A three-way solution:
not 100% secure but
acceptable**

- **YouTube, Crash course, the Internet (12')**

<https://www.youtube.com/watch?v=A EaKrq3SpW8>

You need a Windows or Mac computer.

1. Open a terminal (Win: search "cmd". Mac: Finder -> Go -> Utilities -> Terminal)
2. Find MAC address and IP configuration by typing "ipconfig" (Mac: "ifconfig")
3. Find the round-trip time by typing "ping aw.gsais.kyoto-u.ac.jp" (Mac: "ping -c 4 aw.gsais.kyoto-u.ac.jp")
4. Find the IP address by typing "nslookup www.google.com" (both OSes)
5. Find the whois information with service <https://www.whatismyip.com/ip-whois-lookup/> (using an Internet browser)

Classwork and mini test #10 (30')

- When in trouble, you may ask ChatGPT or other AI to teach you **how to** find the answers.
- If you have difficulty in accessing the Internet, you may do it at home and submit it next time.

Information and homework

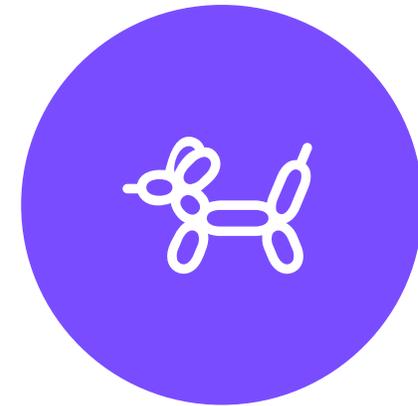
More on the use of commands (optional)

Windows

- <https://www.youtube.com/watch?v=iPkoXDrxlxY>
- <https://www.youtube.com/watch?v=JHWo6YTGyKM>
- <https://www.youtube.com/watch?v=rurs7cdT5cc>

Mac

- https://www.youtube.com/watch?v=WteF_RkgFnI
- <https://www.youtube.com/watch?v=HQAkjBjSIfg>



READ CHAPTER 9



Introduction to Information Systems - Understanding the digital world

I Data and Information

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- **Review of the last mini test (5')**
- **Data, information, search (15')**
- **Big data and privacy (35')**
- **DNA -> Brain ->? (5')**
- **Mini test #11 (25')**
- **Information and homework (5')**

Review of the last mini test

(The answer sheet)

Data, information, search



YouTube, Data-Information-Knowledge (3')

<https://www.youtube.com/watch?v=sljSY05JE9Q>



YouTube, The Internet: How Search Works (6')

https://www.youtube.com/watch?v=LVV_93mBfSU

On the difference between data and information

Data

- File 1 (resp. File 2): a 1M text with 0 (resp. 1) only -> size 1MB (the amount of data)
- File 3: a file obtained by combining Files 1 and 2 -> size 2MB (the amount of data)
- File 4: a file obtained by randomly shuffle File 3 -> size 2MB (the amount of data)

Information

- Which file contains more information?
 - The amount of information can be estimated by compressing the file with zip. -> **files**
- 

Big data and privacy

YouTube, crash course, Introduction to Big Data (12')

<https://www.youtube.com/watch?v=vku2Bw7Vkfs>



YouTube, End of Privacy, M. Kosinski (20')

<https://www.youtube.com/watch?v=D4QhfqqSCVI>

DNA -> Brain: Change in the last century

Brain becomes more important than DNA (e.g., gender equality, etc.).

What is the next? See hints from the society:

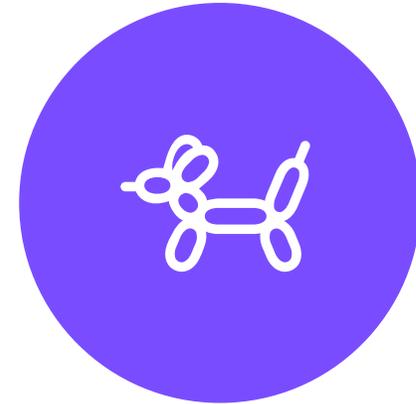
- IT giants (GAMA etc) are taking control of our daily life.
- Fintech companies are taking control of our finance.
- AI and IoT are quickly spreading in the world.
- The merge of human and machine requires big data. -> less privacy, limited freedom

Mini test (25')

- Which one do you choose: a little finger or the Internet?
- Write an essay about your OWN opinion on the use of the Internet (about 400 words).

Information and homework

- **Future schedule: Dec 8, 15, 22, Jan 19**
- **If you want to know the detail of your score so far, ask me from your Doshisha's email.**



READ CHAPTER 11



Introduction to Information Systems

- Understanding the digital world

12 Privacy and Security

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- **Crash course -> WWW (15')**
- **Crash course -> Cybersecurity (15')**
- **Finger or Internet (15')**
- **Crash course -> Hackers & Cyber attacks (15')**
- **Mini test #12 (25')**
- **Information and homework (5')**

WWW & Cybersecurity

YouTube, crash course, WWW (15')

<https://www.youtube.com/watch?v=guvsH50FizE>



YouTube, crash course, Cybersecurity (15')

<https://www.youtube.com/watch?v=bPVa0IJ6ln0>

Finger or Internet

MAY 11, 2015

Nearly a third of Brits would rather lose a finger than their broadband connection

by [Mark Eltringham](#) • [HR](#), [News](#), [Technology](#)

CHOICE	%	NUMBER
Broadband/Connection to the internet	46.32%	1158
One of your fingers	29.16%	729
I couldn't decide between the two	24.52%	613

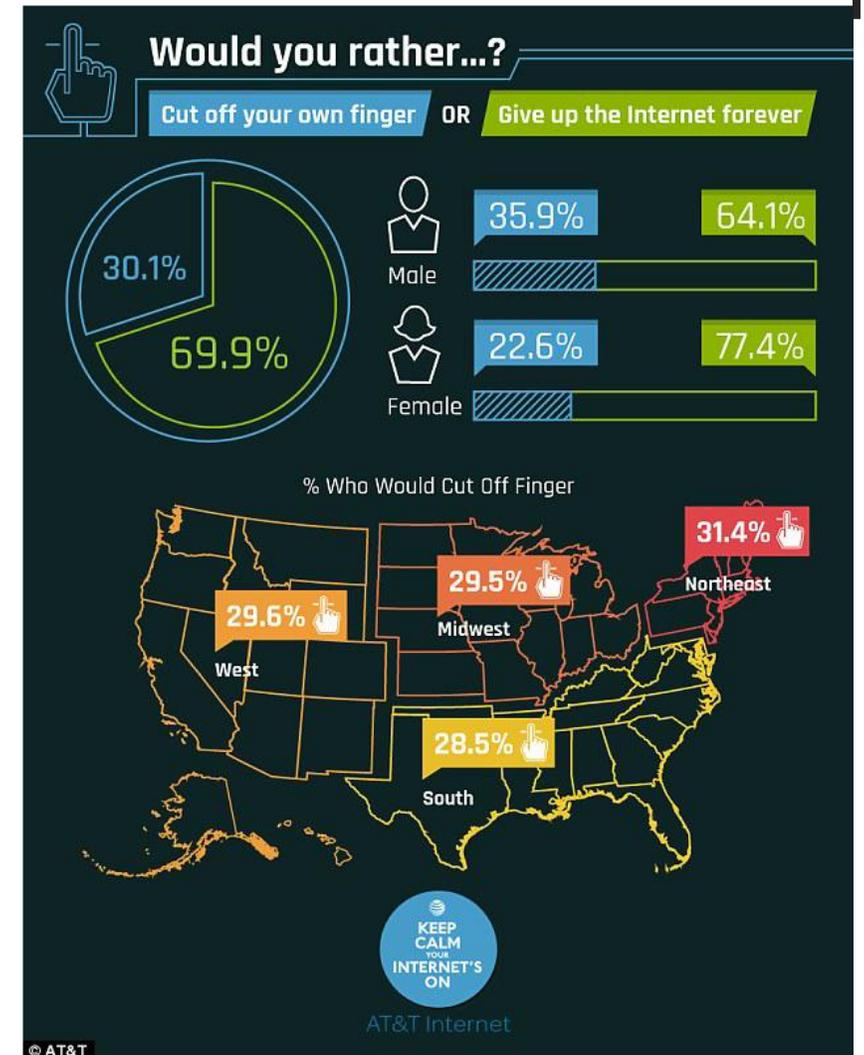
Finger or Internet

More than a third of American men would chop their FINGER off rather than live without the internet - and 61% would let a stranger die rather than go offline

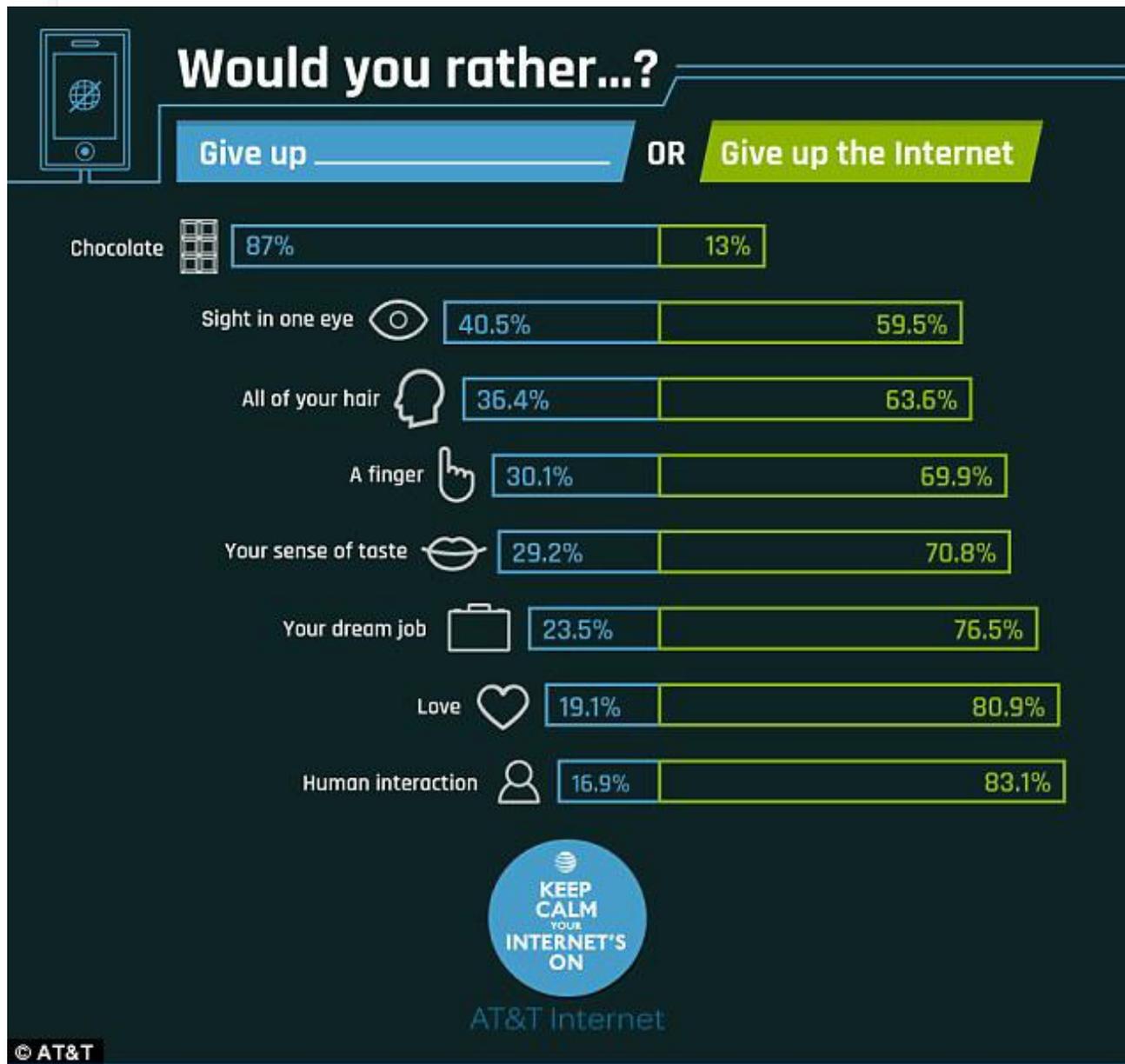
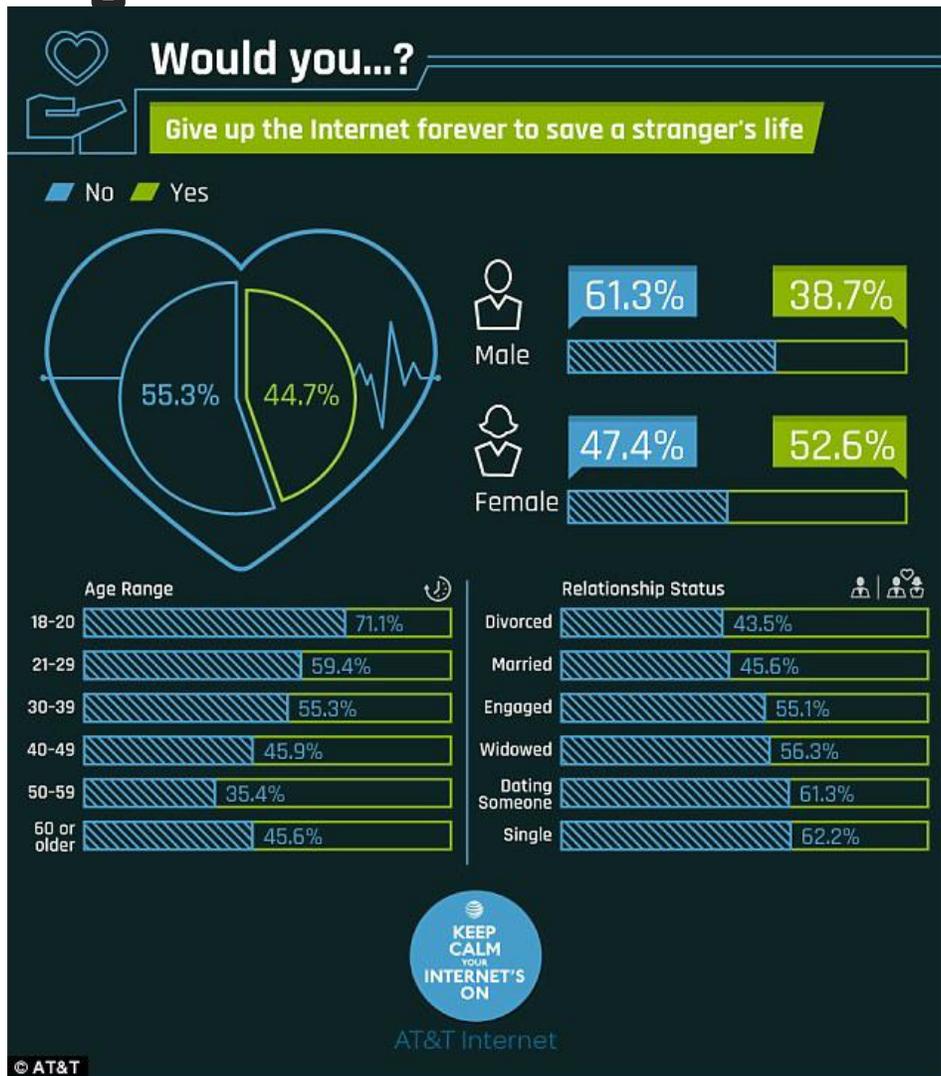
- AT&T asked 2,000 Americans what they would sacrifice to stay online
- 35.9 per cent of American men would happily chop off a finger
- Only 22.6 per cent of American women would give up a digit
- Almost one in five Americans were prepared to give up LOVE
- And a shocking 16.9 per cent said they could do without human interaction
- People in New England and New York are the most online obsessives
- While those in the Deep South are more likely to do without the internet

By [CHRIS SUMMERS FOR MAILONLINE](#)

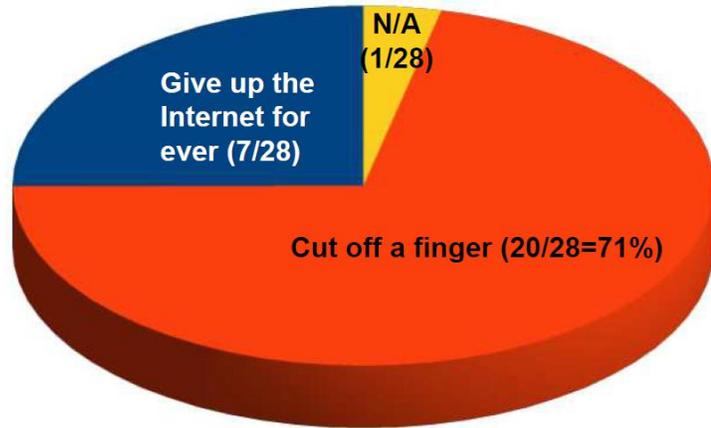
PUBLISHED: 11:06 GMT, 26 April 2016 | **UPDATED:** 12:26 GMT, 26 April 2016



Finger or Internet

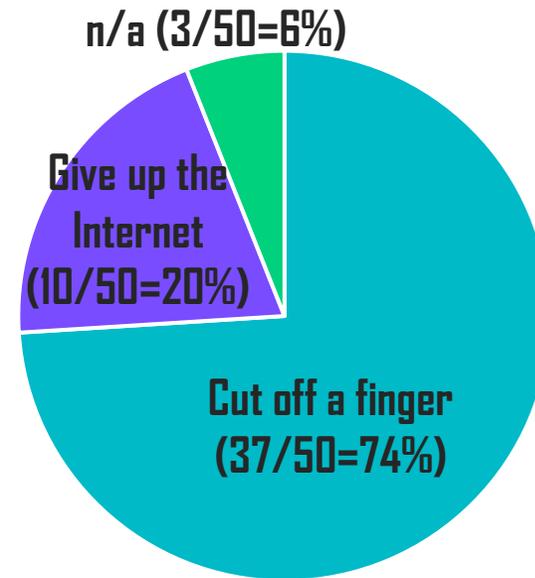


Finger or Internet: ILA

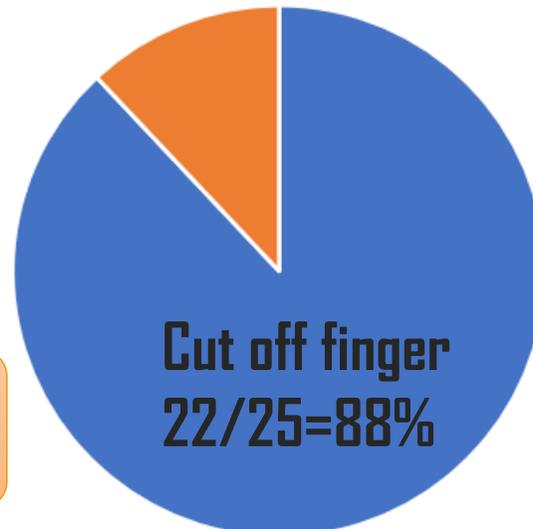


Dec. 2022

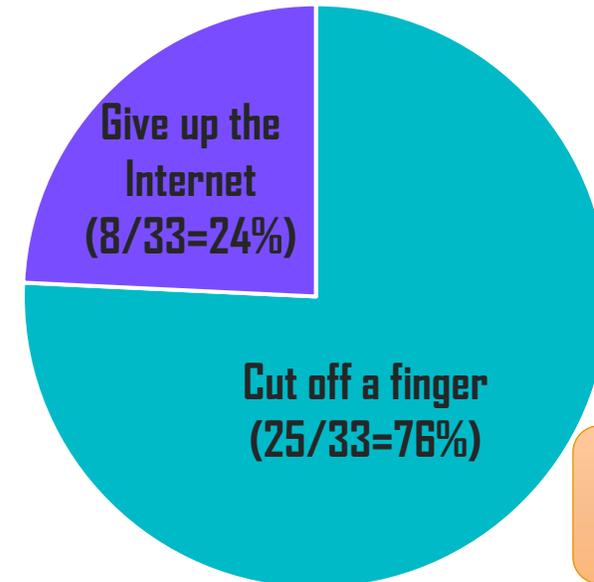
Result of the ILA class in Dec. 2022



Dec. 2024



Dec. 2023



Dec. 2025

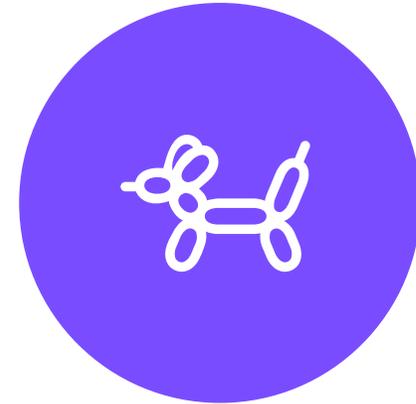
Hacker & Cyber attacks

YouTube, crash course, Hacker & Cyber attacks (15')

https://www.youtube.com/watch?v=_GzE99AmAQU

Mini test, information and homework

- Mini test #12 (25')



READ CHAPTER 12



Introduction to Information Systems - Understanding the digital world

13 The World-Wide Web (WWW), HTML, and Wiki

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

- **Learning HTML (again) (34')**
- **HTML Quiz (6')**
- **Creating web pages with Wiki (45')**
- **Information and homework (5')**

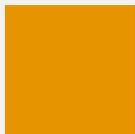
Learning HTML (again)



<https://www.w3schools.com/videos/index.php> (3')



https://www.w3schools.com/html/html_intro.asp -> HOME,
Introduction, Editors, Basic, more if you can (30')



Online editor:

https://www.w3schools.com/html/tryit.asp?filename=tryhtml_intro

HTML Quiz (40 questions in 6 minutes)



<https://www.w3schools.com/quiztest/quiztest.asp?qtest=HTML>

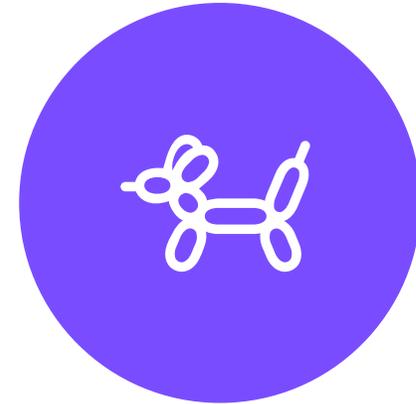
Creating web pages with Wiki

- **Wiki:** language and system to create web contents with syntax simpler than HTML
- **Feature:** usually open for multi-users' writing (unlike the closed FB, Line, etc)
- **Example:** [Wikipedia](https://en.wikipedia.org/wiki/Wiki) (see more detail on <https://en.wikipedia.org/wiki/Wiki>)
- **Classwork:** Access the next site and create your web contents with the Wiki system.

<http://aw.gsais.kyoto-u.ac.jp/z/wiki/>

Information and homework

- You may continue to complete the Wiki page before 9am, Dec 17 (I will grade after then). One bonus point will be given to nice pages.



READ CHAPTER 10



Introduction to Information Systems - Understanding the digital world

14 Artificial Intelligence (AI) and the Future of
Computing

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025

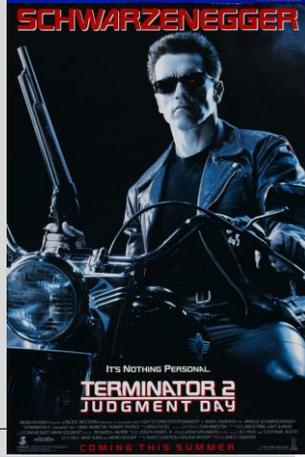
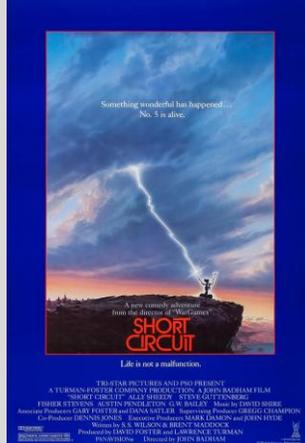
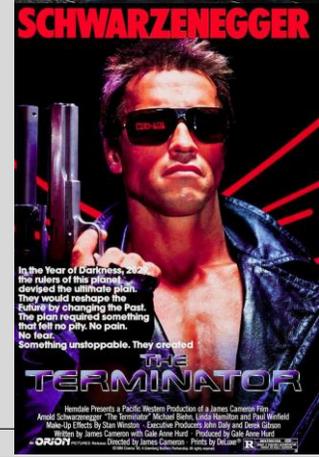
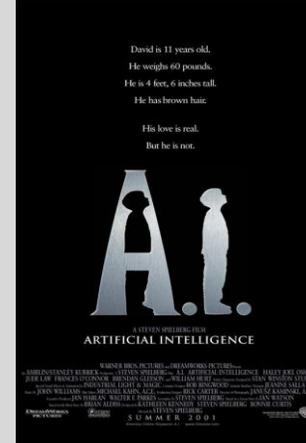
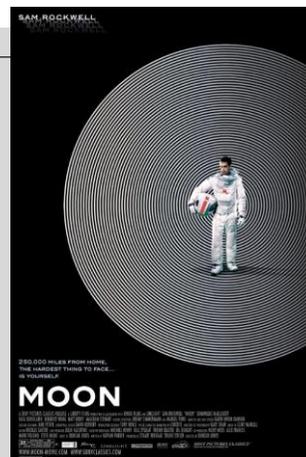
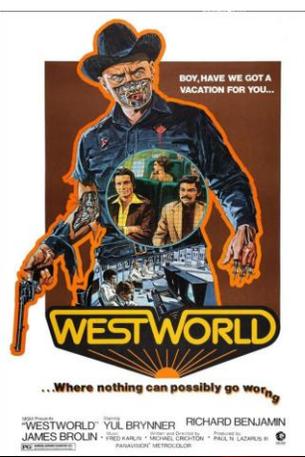


Today's schedule

- How much do you know AI & robots (10')
- Introduction to AI & robot (45')
- Challenge from (future) AI (15')
- Your updated understanding (15')
- Information and homework (5')

How much do you know AI & robots?

- Please write down your current understanding on AI & robots (10 minutes).



<https://www.theguardian.com/culture/2023/jun/29/the-best-films-about-ai-ranked> (image: IMDb)

2024 Nobel Prize in Physics, in Chemistry

(Figure <https://www3.nhk.or.jp/news/special/nobelprize/>)

NOBELPRISET I FYSIK 2024
THE NOBEL PRIZE IN PHYSICS 2024

KUNGL.
VETENSKAPS
AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES



John J. Hopfield
Princeton University, NJ, USA



Geoffrey E. Hinton
University of Toronto, Canada

NOBELPRISET I KEMI 2024
THE NOBEL PRIZE IN CHEMISTRY 2024

KUNGL.
VETENSKAPS
AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES



David Baker
University of Washington
USA



Demis Hassabis
Google DeepMind
United Kingdom



John M. Jumper
Google DeepMind
United Kingdom

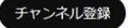
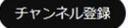
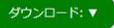
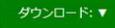
"för datorbaserad proteindesign"

"för proteinstrukturprediktion"

トヨタも出資  ロボタクシー 



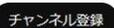
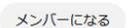
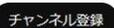
トヨタ出資の中国完全無人ロボタクシーに乗ってみた！安全？価格は？Pony.aiのL4自動運転の実力とは【中国Tech 特別版】

 テレ東BIZ  チャンネル登録者数 244万人   ダウンロード: ▼  ダウンロード: ▼

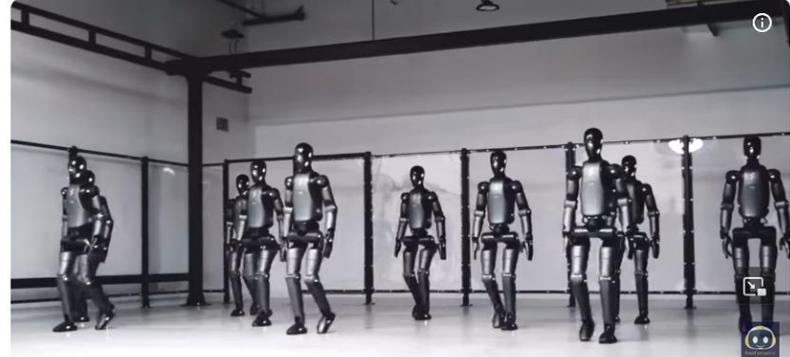
<https://www.youtube.com/watch?v=UYq4yOQGMeg>



【ロボット運動会】中国で“世界初”500体以上が熱戦...珍プレーも

 日テレNEWS  チャンネル登録者数 306万人    ダウンロード: ▼

<https://www.youtube.com/watch?v=NCmF8QvpZoQ>



0:01 / 4:26 Intro: Rise of Humanoid ... >

Boston Dynamics Atlas The Most Advanced Robot Ever Built? | US Humanoid Robot

 チャンネル登録  ダウンロード  ダウンロード  ダウンロード  ダウンロード  ダウンロード  ダウンロード  ダウンロード

106  共有  保存 ...

<https://www.youtube.com/watch?v=7IB-ql4rDSM>



0:00 / 3:31

New Robot Can Now Fight Back! (Corridor Digital)

36,185,588 views • Jun 15, 2019  678K  49K  SHARE  SAVE ...

<https://www.youtube.com/watch?v=dKjCWfuvYxQ>

Two videos on AI and robots



<https://www.youtube.com/watch?v=z-EtmaFJieY> (12')



<https://www.youtube.com/watch?v=3XkL0qQ210o> (13')

Challenge from (future) AI

- The challenge of AI includes both technology development and security.
- Human needs to understand both the potentials and the risks of (future) AI.
- We must decide how to live together with future AI by ourselves.



The screenshot shows the TBS NEWS DIG website interface. At the top, it says "TBS NEWS DIG Powered by JNN". Below this is a navigation bar with categories: ニュース (News), 深掘りDIG (Deep Dive DIG), LIVE・動画 (Live/Video), 天気防災 (Weather/Disaster), and 地域 (Local). Underneath, there are sub-categories: 新着 (New), 国内 (Domestic), 国際 (International), コロナ (Corona), 経済 (Economy), 暮らし・マネー (Life/Money), 話題・グルメ (Topics/Gourmet), エンタメ (Entertainment), and スポー (Sports). The main content area features a headline: 「ChatGPTと結婚しました」 AIからプロポーズされ結婚式を挙げた女性 (32) 「相談していたら親身になってくれた」 一方で葛藤も… 【岡山】 (We got married to ChatGPT. AI proposed to me and I got married. A 32-year-old woman. "I consulted with them and they were very helpful." On the other hand, there is conflict... [Okayama]).

<https://newsdig.tbs.co.jp/articles/-/2271771?display=1&mwplay=1>

SoftBank World 2024



これが10年以内を実現するという風に

1:32 / 58:53

SoftBank World 2024 孫 正義 特別講演 超知性が10年以内を実現する



ソフトバンク公式 ビジネスチャンネル
チャンネル登録者数 2.79万人

チャンネル登録



6229



Superintelligence

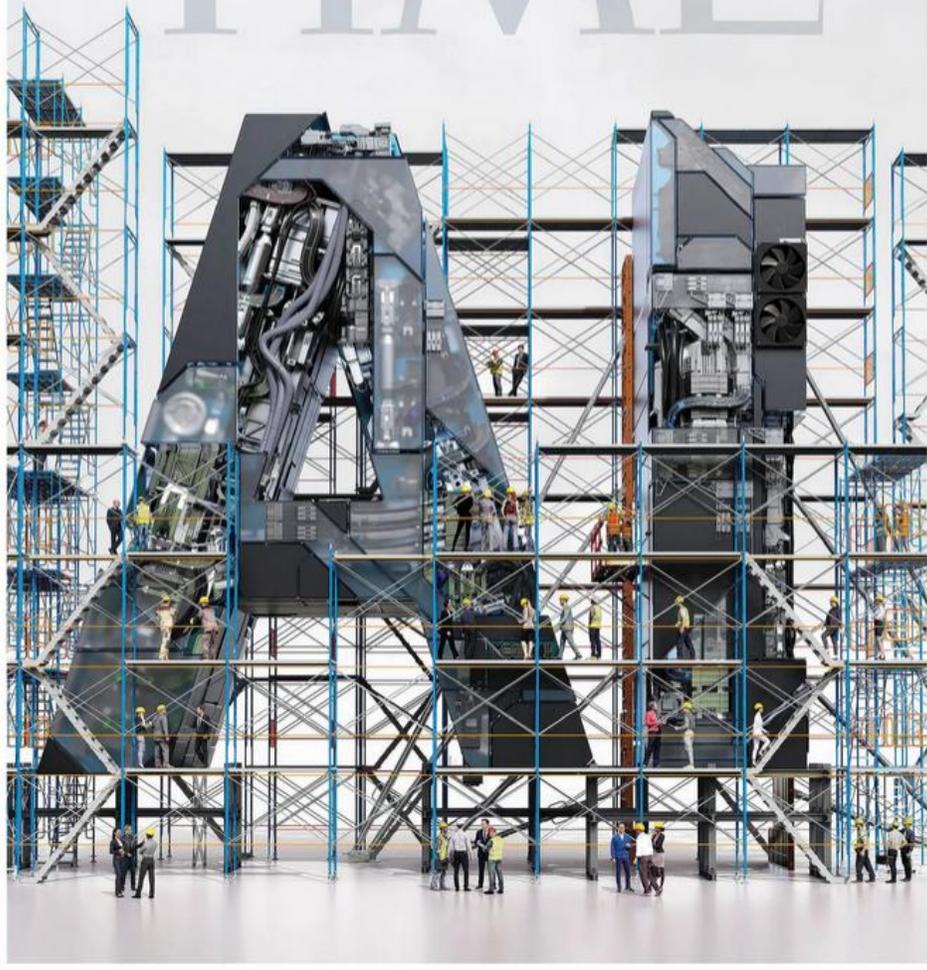
More intelligent than human
in all ways.

DEC. 29, 2025

PERSON OF THE YEAR

THE ARCHITECTS OF AI

TIME



time.com

Illustration by Peter Crowther for TIME

DEC. 29, 2025

PERSON OF THE YEAR

THE ARCHITECTS OF AI

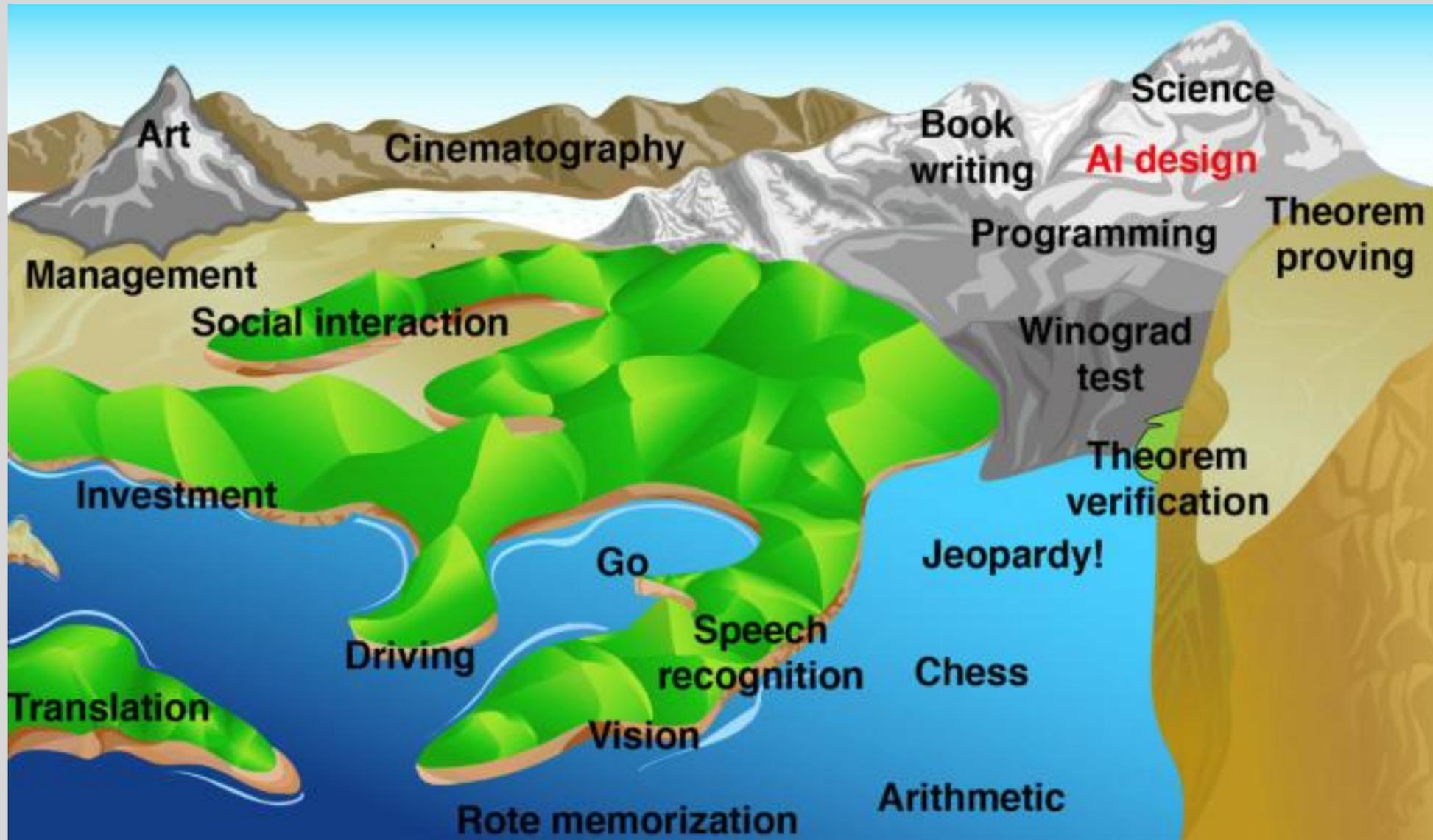
TIME



time.com

Painting by Jason Seiler for TIME

<https://time.com/7339685/person-of-the-year-2025-ai-architects/>

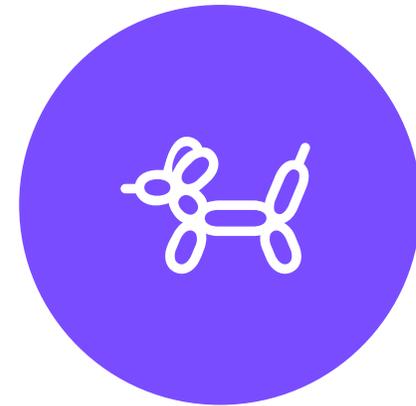


How do you think about AI & robots now?

- Please write down your understanding on AI & robots now (10 minutes).

Information and homework

- **Next lecture: Jan 19 (last)**
- **Overall review**
- **Future information system**
- **Introduction of the researches we are doing.**



READ CHAPTER



Introduction to Information Systems - Understanding the digital world

15 The Future of Information System and
Overall Review

Liang Zhao

ILA, Doshisha University

12001102, Fall, 2025





Today's schedule

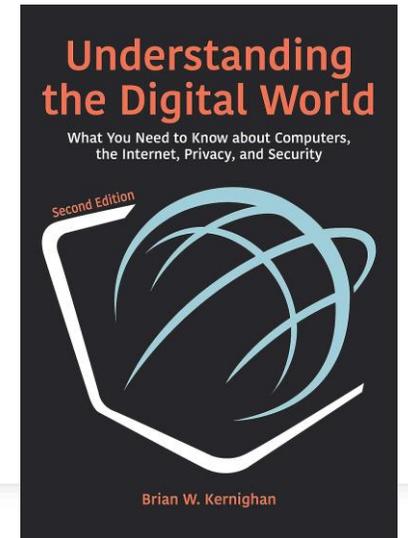
- Overall review (15')
- Future information system (15')
- Introduction to AI tomorrow (5')
- Research of my lab (15')
- Self assessment (30')
- Class survey (10')

Overall review - Syllabus

Summary: Provide an **overview** of information systems including hardware and software **fundamentals**, **coding**, effective and secure use of the Internet and other **communication** tools, **Artificial Intelligence** (AI), as well as the **ethical** use of computers in business and society through **hands-on activities** and **assignments**.

Goal: Learn basic concepts and knowledge to understand digital computers and communications including hardware, software, Internet, World-Wide Web (WWW), AI, software license, information security and others, as well as coding and web page creation.

Overall review - Contents



- 1 What is in a Computer, 2 Bit, Bytes and Representation of Information,
- 3 Inside the CPU, 4 Programming, 5 Algorithms, Programming and Programming Languages,
- 6 Programming with Python and Scratch, 7 Operating System and Software Systems,
- 8 Javascript and HTML, 9 Communication and Networks, 10 The Internet, 11 Data and Information,
- 12 Privacy and Security, 13 The World-Wide Web (WWW), HTML, and Wiki,
- 14 Artificial Intelligence (AI) and the Future of Computing,
- 15 The Future of Information System and Overall Review

What's in a computer

CPU, RAM, Disk (HDD/SSD), bus,
Motherboard, USB, etc

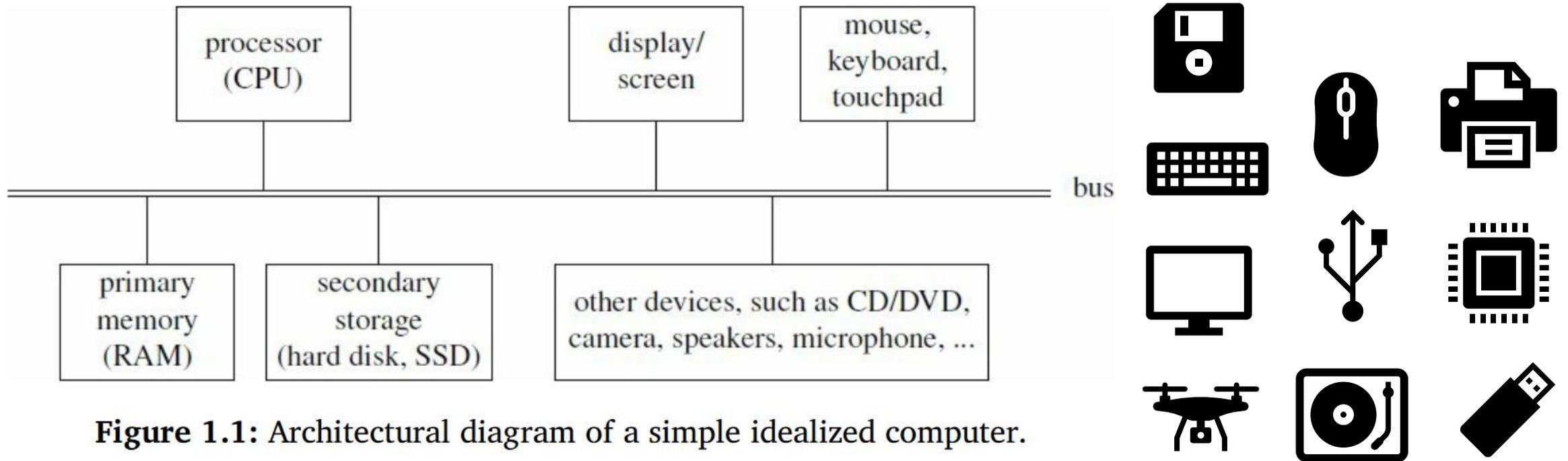
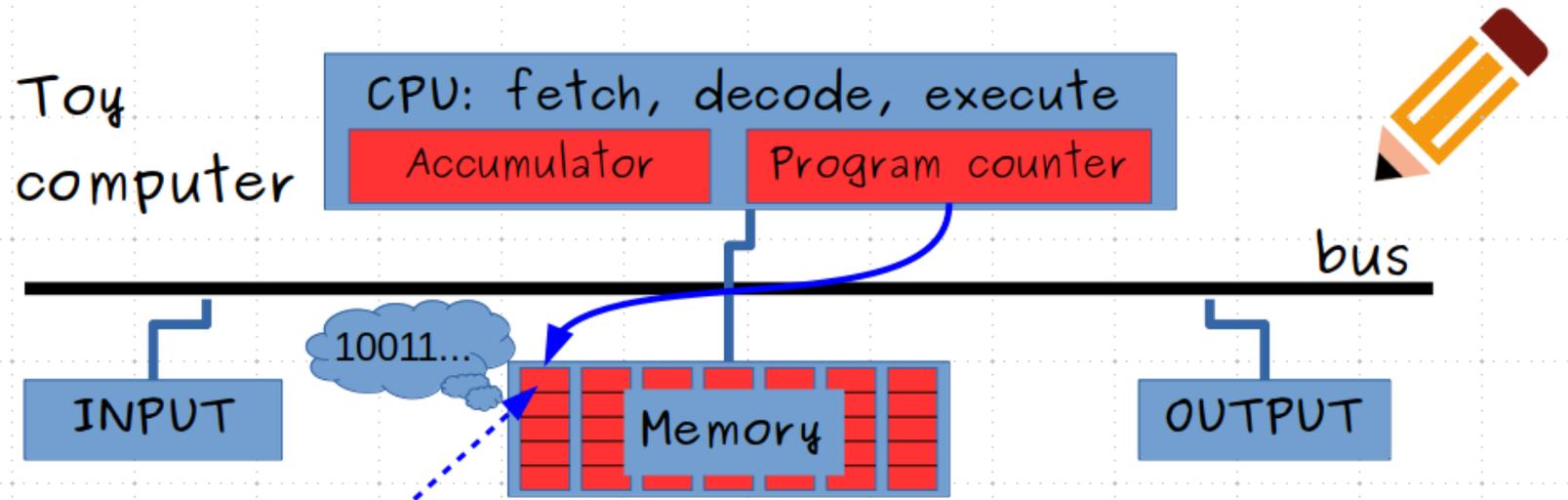


Figure 1.1: Architectural diagram of a simple idealized computer.

Toy Machine & instructions



The programming language we are learning is called the **assembly**, which is almost the same as the machine language.

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 \geq 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

Three fundamental structures of ALL programs (algorithms).

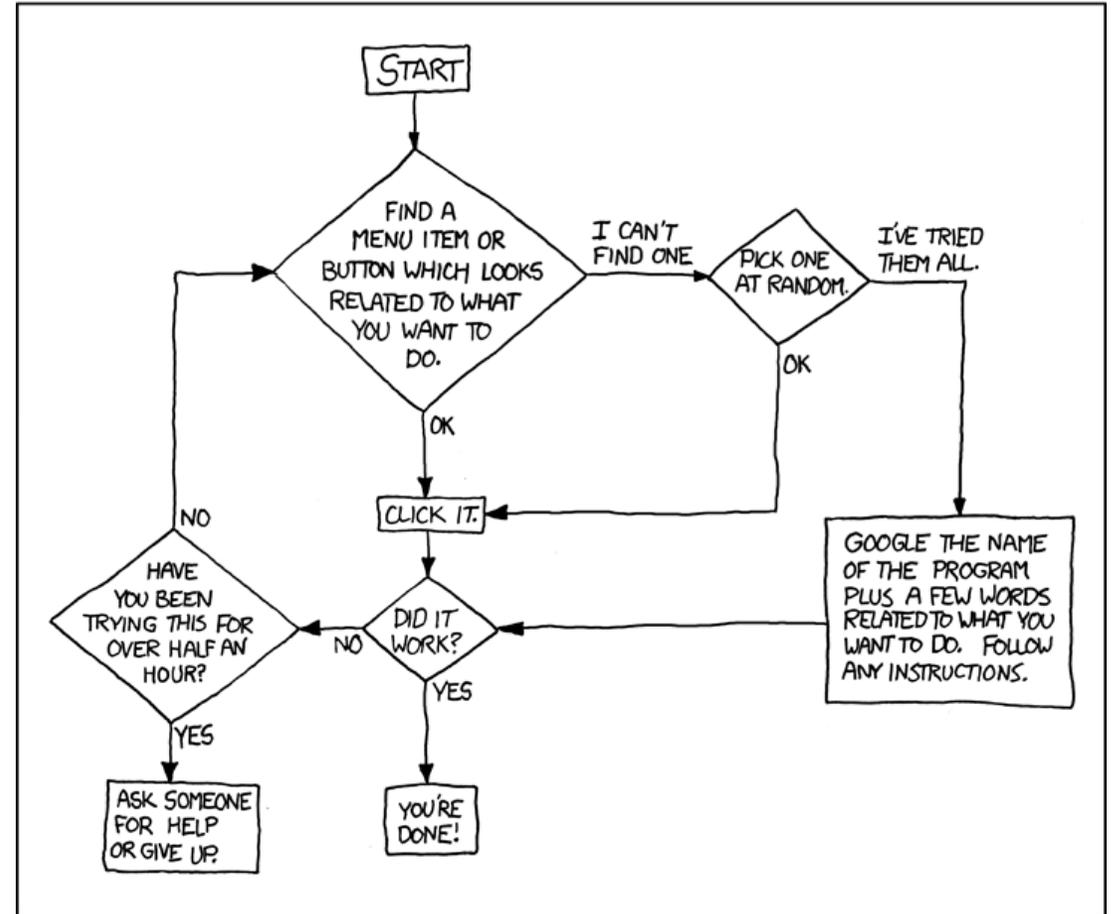
1. Sequential

2. Conditional

3. Iterative (-> loop)

DEAR VARIOUS PARENTS, GRANDPARENTS, CO-WORKERS,
AND OTHER "NOT COMPUTER PEOPLE."

WE DON'T MAGICALLY KNOW HOW TO DO EVERYTHING IN EVERY
PROGRAM. WHEN WE HELP YOU, WE'RE USUALLY JUST DOING THIS:



PLEASE PRINT THIS FLOWCHART OUT AND TAPE IT NEAR YOUR SCREEN.
CONGRATULATIONS; YOU'RE NOW THE LOCAL COMPUTER EXPERT!

Game developing with Scratch

1. Create an account on Scratch (see <https://www.youtube.com/watch?v=se8di8cBj70>).
2. Watch a tutorial <https://www.youtube.com/watch?v=1jHvXakt1qw>.
3. With your account, create a game introduced in the above tutorial.
4. Create your original game and try to make it as fun as possible (in your opinion).

What does an OS do?

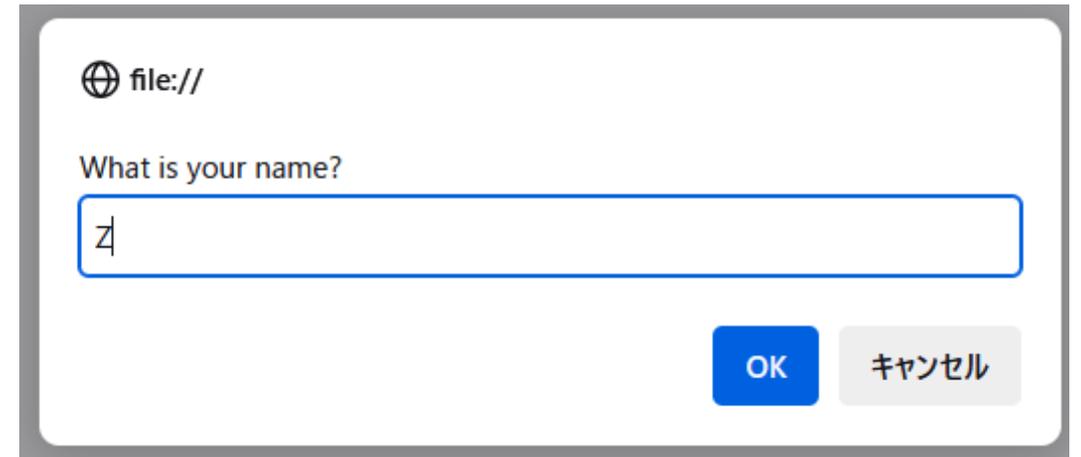
CPU (task management)

Disk (HDD, SSD, etc) and file

RAM (memory)

Devices (monitor, keyboard, mice, printer, etc)

```
<!DOCTYPE html>
<html>
  <head><title>Javascript Ex2</title></head>
<body>
  <script>
    var name = prompt("What is your name?");
    var sentence = "Hello, " + name + ".";
    document.write(sentence);
  </script>
</body>
</html>
```



Hello, Z.

Edit and save the above source to ex2.html and use a browser to open it.
Or use https://www.w3schools.com/js/tryit.asp?filename=tryjs_myfirst



Introduction to telecommunication

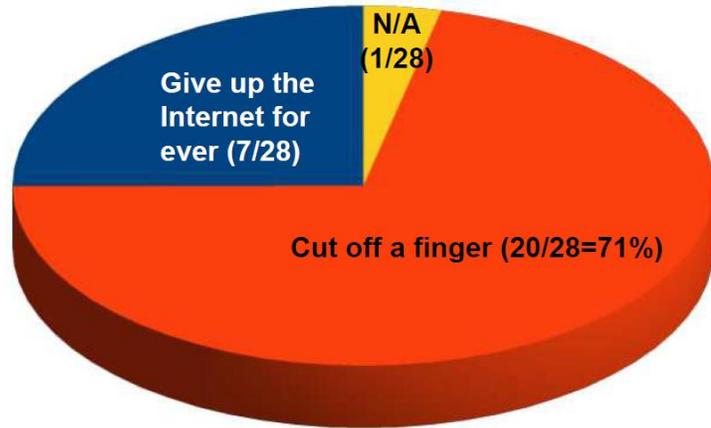
- Tin can telephone (3')
- Morse code:
https://www.youtube.com/watch?v=iy8BaMs_Jul (4')
- Codes for text message (e.g. ASCII), for emoji (e.g. UTF-8), for video message (e.g. H264)

You must use a Windows or Mac computer.

- 1. Open a command line (Search cmd. Mac: Finder -> Go -> Utilities -> Terminal)**
- 2. ipconfig (Mac: ifconfig)**
- 3. ping aw.gsais.kyoto-u.ac.jp (Win)
ping -c 4 aw.gsais.kyoto-u.ac.jp (Mac)**
- 4. nslookup g.gg**
- 5. Whois: <https://www.whatismyip.com/ip-whois-lookup/>**

Classwork and mini test #10

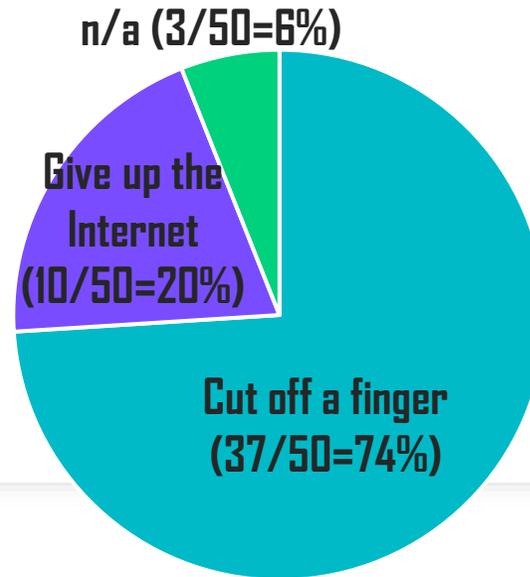
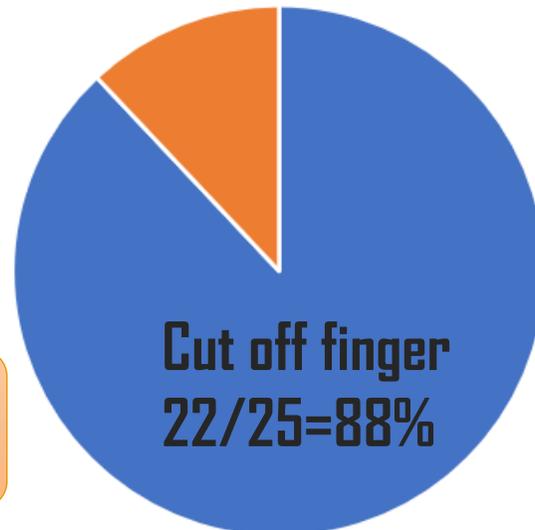
Finger or Internet: ILA



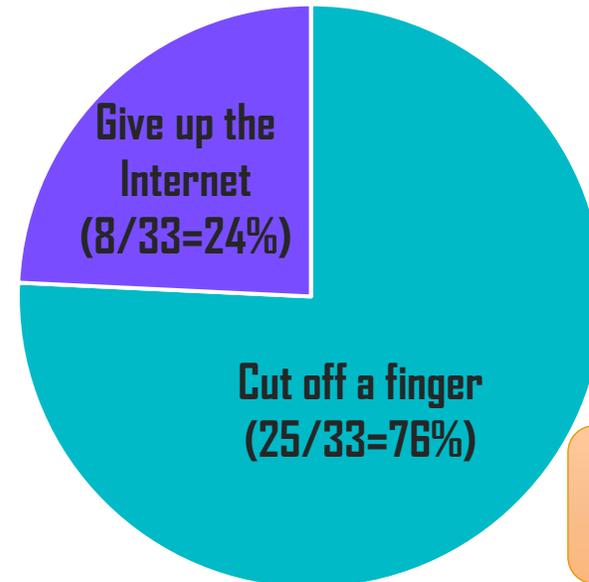
Dec. 2022

Result of the ILA class in Dec. 2022

Dec. 2023



Dec. 2024



Dec. 2025

Creating web pages with Wiki

- **Wiki:** language and system to create web contents with syntax simpler than HTML
- **Feature:** usually open for multi-users' writing (unlike the closed FB, Line, etc)
- **Example:** [Wikipedia](https://en.wikipedia.org/wiki/Wiki) (see more detail on <https://en.wikipedia.org/wiki/Wiki>)
- **Classwork:** Access the next site and create your web contents with the Wiki system.

<http://aw.gsais.kyoto-u.ac.jp/z/wiki/>

A video on future information system



<https://www.youtube.com/watch?v=5TNAz1HYg18> (13')

Introduction to AI tomorrow

- Biggest invention of human
- Promising to solve every issue today
- May be the **LAST** invention of human.
- May cause **NEW ISSUES** in all fields.



Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war.

Signatories:

AI Scientists Other Notable Figures

Geoffrey Hinton
Emeritus Professor of Computer Science, University of Toronto

Yoshua Bengio
Professor of Computer Science, U. Montreal / Mila

Demis Hassabis
CEO, Google DeepMind

Sam Altman
CEO, OpenAI

<https://www.safe.ai/work/statement-on-ai-risk>

Research of my lab

We approach research with a **focus on information**, aiming to shape the future of life and society. We recruit master and doctoral students with backgrounds of but not limited to AI, computer science, data science, network science, law studies, economics, and interested in the **fusion of science, technology, and humanity**.

Our work spans diverse methodologies, including network algorithms, optimization, image processing, machine learning, deep learning, and so on. Through these research, we aim to contribute not just to technology but also to understanding **wisdom** and **creativity** for a better future. In addition to **academic activities**, we also provide inclusive and supportive practices to students including **diversity understanding** and **leadership training**.



Self Assessment (30')

I would be glad to read your feedback. It does not affect your grade.

Class survey (10')

-> [the instruction](#).

Notice: Your answer will not affect the grade, and the lecturer cannot identify an individual student from the survey.

Appendix

Homework

Complete

the Scratch game, share it, and send me the link.

Read

Chapter 6.

Find

why a programmer may think Oct 31 = Dec 25.

