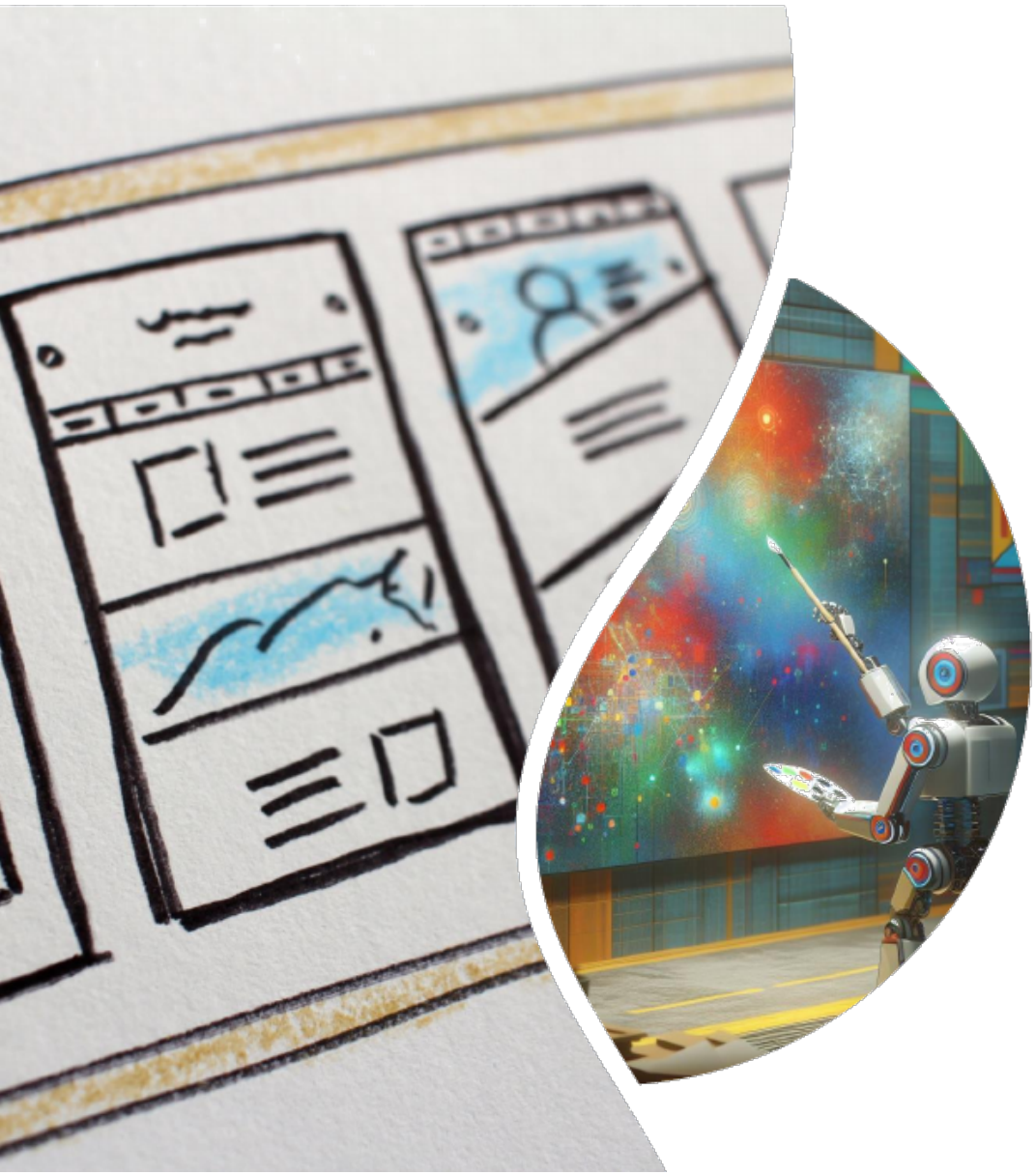


DGIN 5201
Digital Transformation
Lecture 7

Computing and Information-Tech Foundations

Vlado Keselj

Time and date:
10:05–11:25, 03-Feb-2026
Location: McCain 2170

Image: DALL-E. Bing Image Creator. Generated by AI

Unit Description

- Implementing a solution: Rapid prototyping
- Review of Digital Technology foundations
- Hands-on exercises
- Elements of building a three-tier system
- Techniques for rapid prototype building

Building MVP Example

- How to build an MVP (Minimal Viable Product) in a short time?
- Consider a Rapid Prototyping model of development

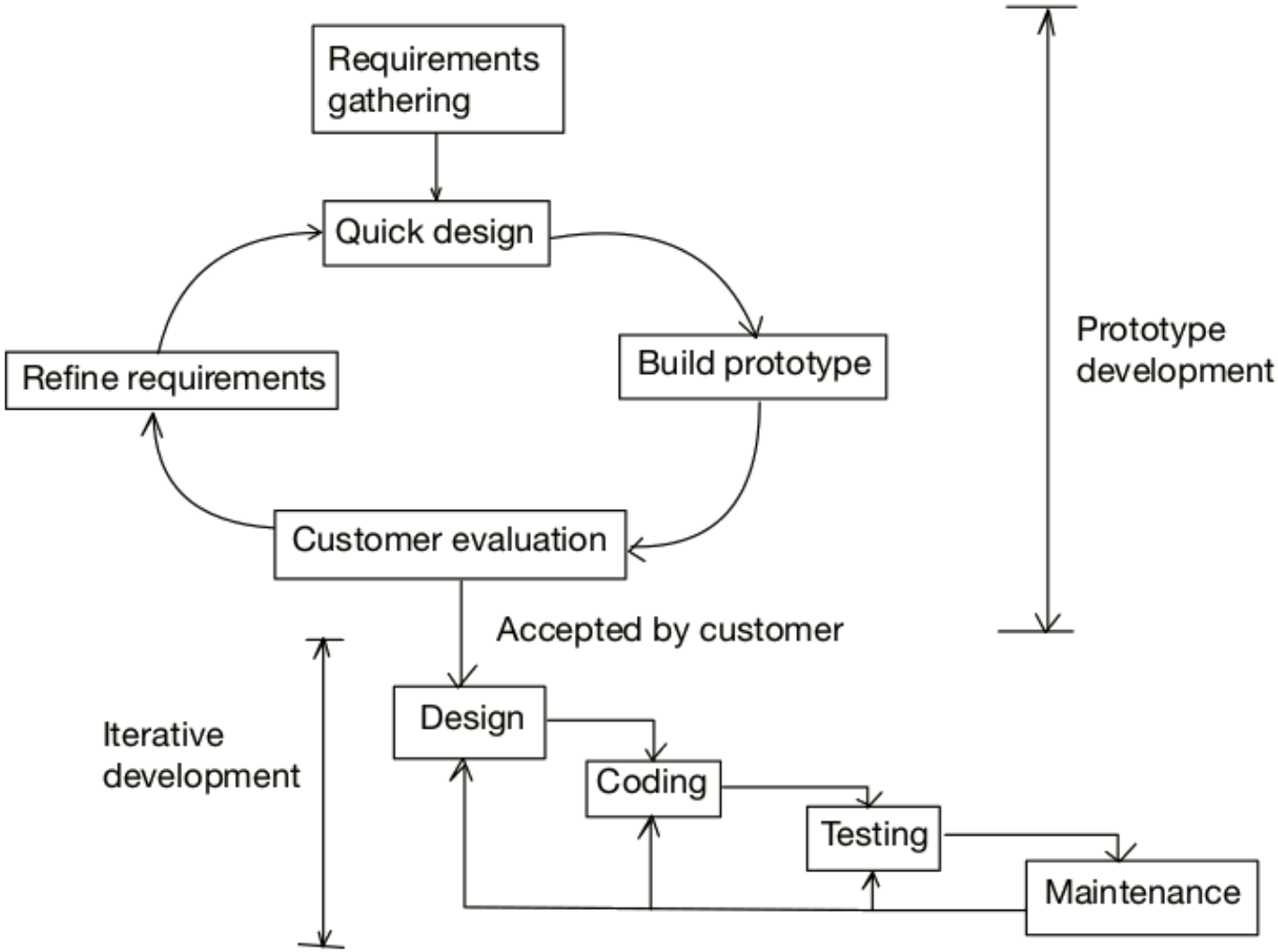
Planning Process of System Development

- One choice is the classic Waterfall model: Requirements, Design, Implementation, Testing, Maintenance
- or, closer to the industrial practice:
  Specifications
    Requirements
      Architectural design
        Detailed design
          Coding
            Integration
              Testing
                Delivery

Which Development Process to Use?

- Waterfall Model is overkill and not completely appropriate
  - follows the "big bang" model of development
- Rapid Prototyping Model is more appropriate
- However, it should not be a rapid "hacking" model
- Have a clear plan to try to make clear steps forward
- Keep a log with completed tasks, and what to do next
- Keep iterating working prototype, and after each iteration be able to declare success and walk away

Rapid Prototyping Model



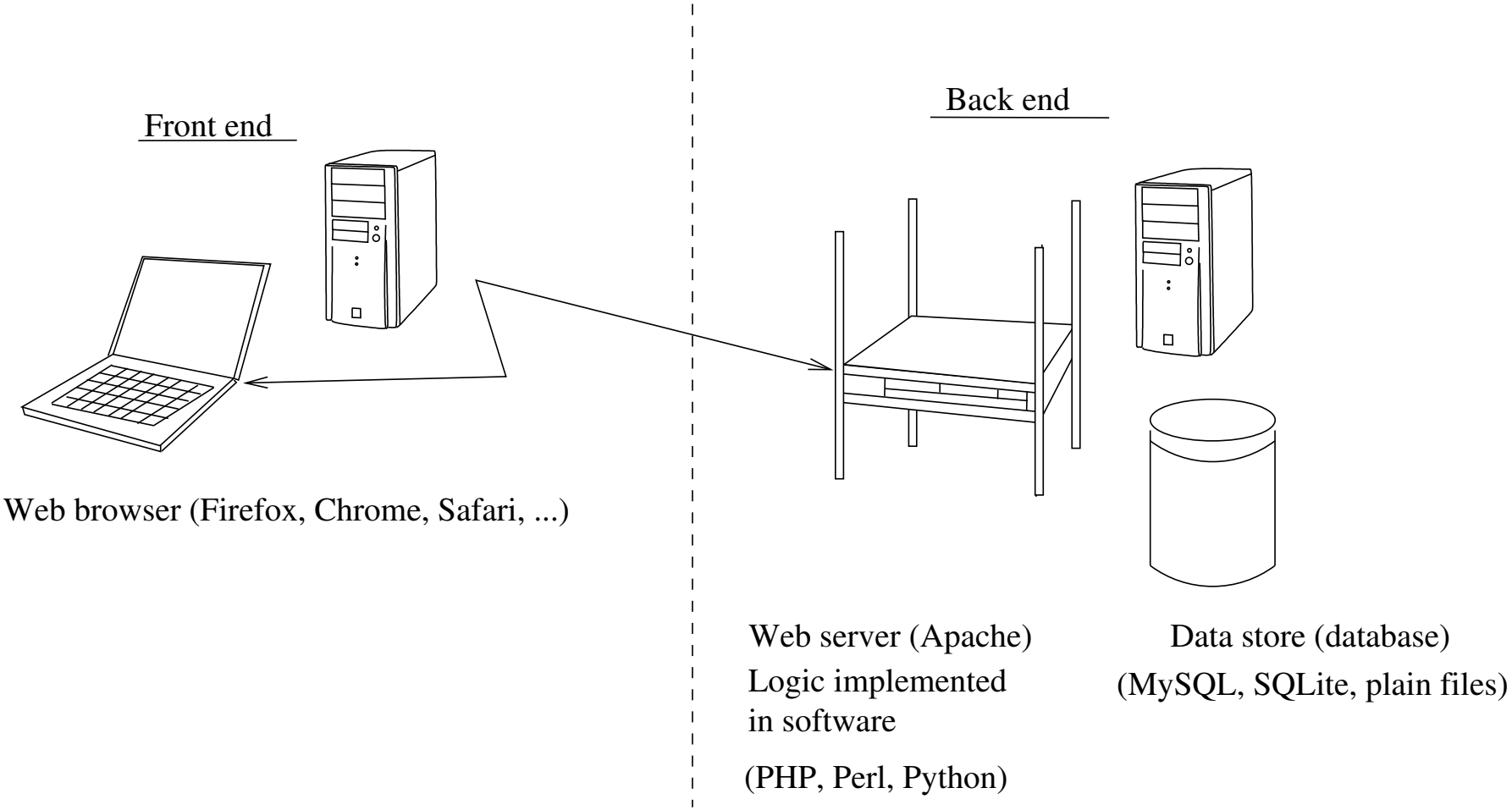
A Less Formal Approach to Development Process

- Conceptual design
  - general description, sketches, scenarios, screenshots, rough diagrams
- Requirements Specification ("what")
  - precise ideas and requirements; understanding that once requirements are set it will be costly to change them
- Architectural Design ("how")
  - overall structure diagrams: components and connections, subsystems, interactions and interfaces, languages, systems, connectivity, data availability
- Implementation ("what by when")
  - make prototype and iterate, get real users asap, prepare tests as you go

Building a Three-Tier Architecture

- Course project requires a Three-Tier Architecture
- Three-Tier Architecture:
  1. User interface
  2. Control logic
  3. Data store

Three Tier Architecture



Three–Tier Architecture

Features of Three-Tier Architecture

- Front-end
  - HTML and CSS in a simple form
  - Improvements: JavaScript, AJAX; jQuery, and JS frameworks
- Back-end, logic tier
  - Scripting languages (PHP, Perl, Python, Ruby, etc.)
  - Straightforward: Apache and CGI
  - Improvements: Web frameworks such as Flask, Django, Mojolicious
- Back-end, data store tier
  - Straightforward: plain files, MySQL, SQLite
  - More: MongoDB, Redis, other database systems

Our Approach in this Unit

- Work on hands-on exercises
- Covering concepts and theory
- Exercises aimed at `timberlea` server
- Use your CSID and password
- Use of web site:
  https://web.cs.dal.ca/~*YourCSID*

Some Background Items

- Check your CSID and password, helpful site: `https://csid.cs.dal.ca/`
- Helpful if you have experience in `ssh` login to `timberlea.cs.dal.ca`
- Mac or Linux: `ssh` can be used from terminal
- Windows (new): `ssh` can be used from terminal
- Windows (older): PuTTY can be used
- PuTTY can be installed from `https://www.putty.org/`

Baseline Implementation

- Assume diverse background knowledge and levels
- Baseline Implementation:
  - login to `timberlea.cs.dal.ca` using CSID
  - work with a shell; e.g., bash, basic Unix commands
  - use of a plain-tex editor: emacs, vi, vscode, or similar
  - use of HTML, scripting languages, JavaScript, CSS
  - plain files for persistant data, database
- Make sure to be familiar with your CSID: `https://csid.cs.dal.ca/`
- Use ssh or PuTTY to login to `timberlea.cs.dal.ca`

Using timberlea Server

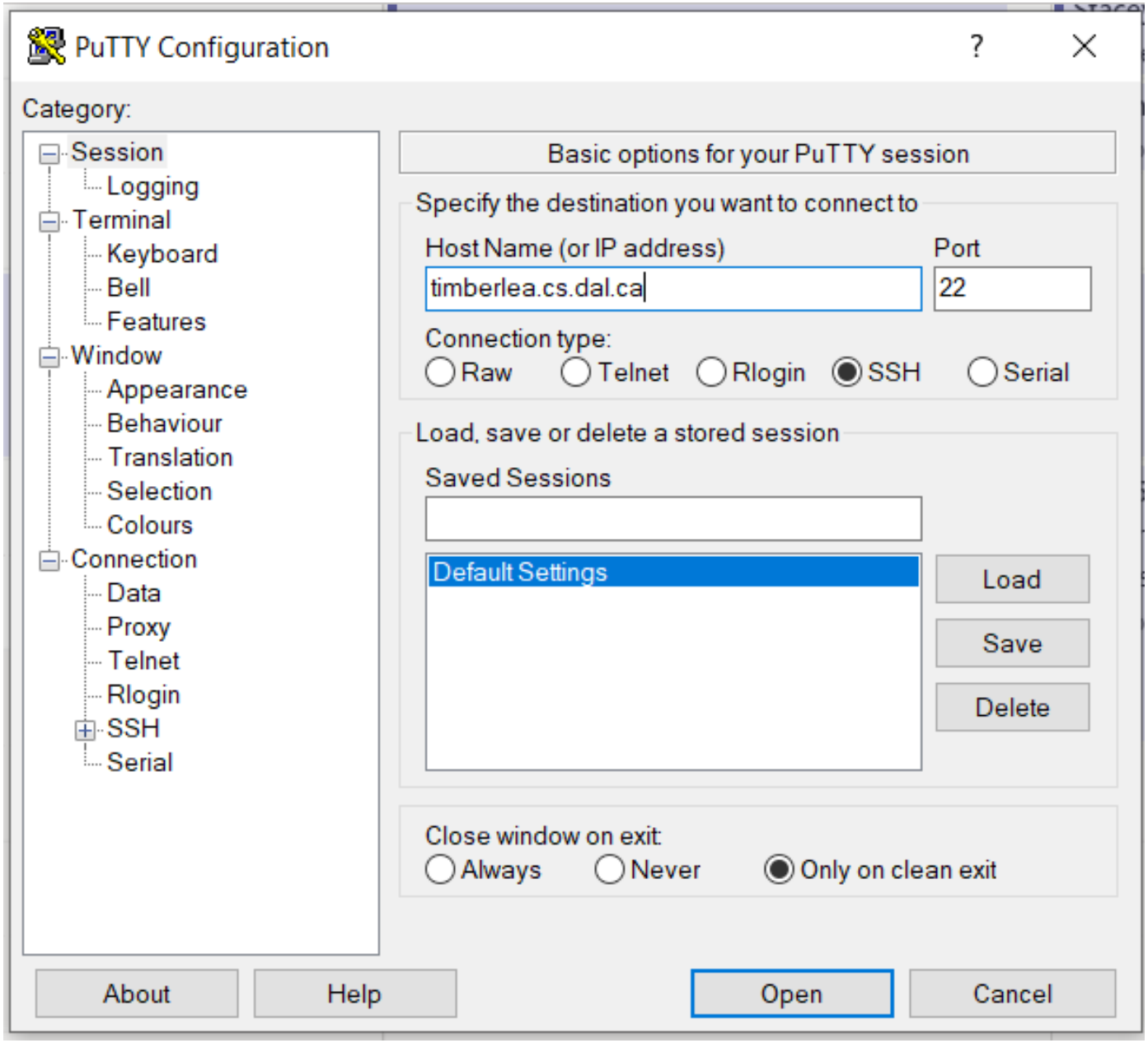
- ssh login into timberlea.cs.dal.ca
- First step: open a Terminal or Command Line Interface:
  - Command Line on Windows
  - Terminal on Mac
  - Terminal on Linux
- use the ssh command:

```
ssh <your_csid>@timberlea.cs.dal.ca
```

  where instead of <your_csid> you should use your own CSID
- Older Windows: you can use the program PuTTY
  - other options available; e.g., MobaXterm

Running PuTTY

- Double-click the PuTTY icon, and the following window should appear:


PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Host Name (or IP address)
Port
timberlea.cs.dal.ca
22
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Default Settings
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Help
Open
Cancel

Hands-on Exercises

- You should use PuTTY or another client to login to `timberlea`
- FileZilla is a good tool to copy files back and forth, but does not provide access to command-line (shell)
- The following exercises should be finished and will be graded as a part of Assignment 1
- Example of command-line (bash shell) access:

Concepts Review

- Shell (a.k.a., terminal, command-line interface)
- Operating System
- Internet connection, TCP/IP
- SSH, Port (port 22)
- DNS System, Email exchange, HTTP, etc.
- Public-key cryptography
  - Public key, private key