HUST

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

ONE LOVE. ONE FUTURE.

**TRƯỜNG ĐẠI HỌC
BÁCH KHOA HÀ NỘI**
HANOI UNIVERSITY
OF SCIENCE AND TECHNOLOGY

IT3180 – Introduction to Software Engineering

1 – Introduction to Software Engineering

ONE LOVE. ONE FUTURE.

What is Software Engineering?

- **Systematic approach** for developing software

- **Methods** and **techniques** to develop and maintain quality software to solve problems

- Study of the **principles** and **methodologies** for developing and maintaining software systems

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Questions addressed by Software Engineering?

- How do we **ensure the quality** of the software that we produce?

- How do we **meet growing demand** and still **maintain budget** control?

- How do we **avoid** disastrous **time delays**?

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Why apply Software Engineering to Systems?

- Provide an **understandable process** for system development

- Develop systems and software that are **maintainable** and **easily changed**

- Develop **robust** software system

- Allow the process of creating computing based systems to be **repeatable** and **manageable**

Historical Perspective

- 1940s: computers invented

- 1950s: assembly language, Fortran

- 1960s: COBOL, ALGOL, PL/1, Operating System
  1969: First Conference on Software Engineering

- 1970s: multi-user systems, databases, structured programming

Historical Perspective (cont.)

- 1980s: networking, personal computing, embedded systems, parallel architectures

- 1990s: information superhighway, distributed systems, OO in widespread use

- 2000s: virtual reality, voice recognition, video conferencing, global computing, pervasive computing,...

- 2010s: autonomos vehicles, new security awareness

- 2020s: AI everywhere

Hardware costs vs Software costs (% of overall cost)
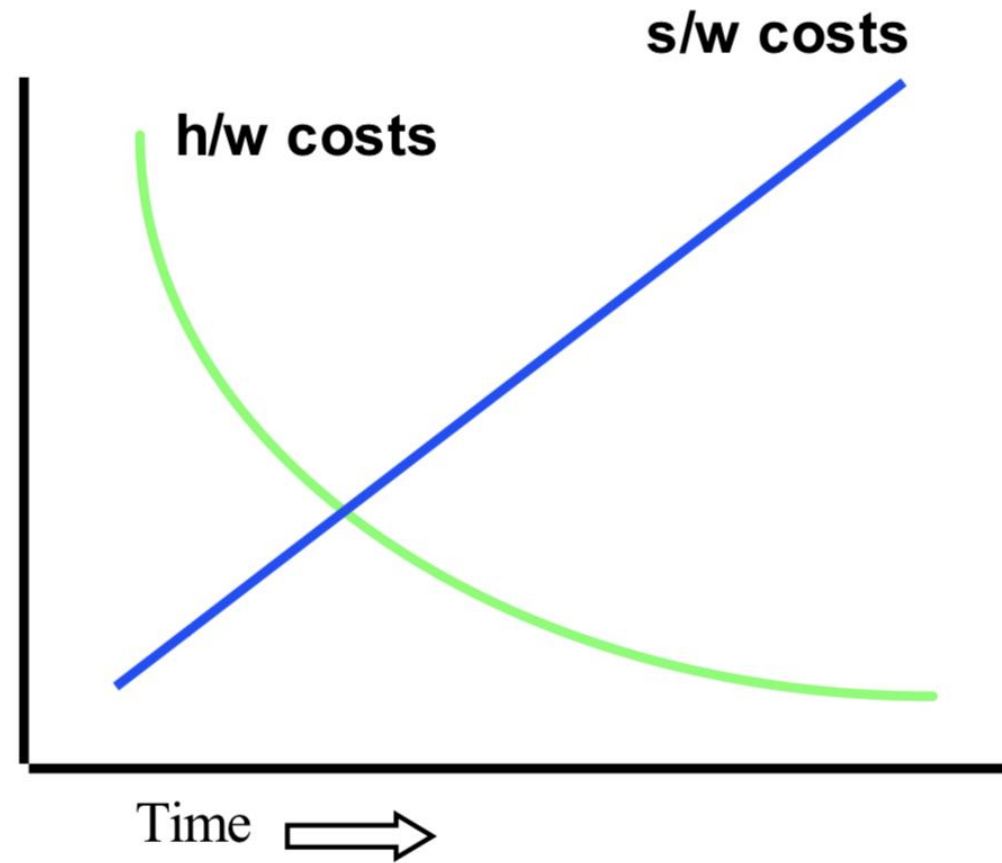
Hardware has made great advances

But software too...

Why is software so expensive?

We need softwares because they help us save money…

Imagine: a software system could save a company $10,000/year

So, why couldn't it charge $9,000?

- Most popular software suites out are software solutions that companies **cannot go without**
    - Productivity software, marketing, logistics, finance …

Why is software so expensive?

Software is **Expensive** to **Produce**

- Labor costs to host hundreds of talented people
- Utilities have to be paid
- Software for software development costs money
- Extensive Q&A process
- Engage in makerting after release
- ... and the most important thing:

Software has to be supported 24/7

Software needs to be updated

Variety of Software Products

- **2 big categories: Application Software vs System Software**
- Web sites
- Operating systems, compilers
- Routers, telephone switchers : communication software
- Telephone billings, Financial Market Predictions: data processing
- Air trafic control, autonomous vehicles: Real time apps
- Device drivers, controllers: Embedded Software
- Digital camera, GPS, sensors: mobile devices
- Information systems: database management, digital libraries
- Offices: word processing, spreadsheet, video conferences
- Scientific: simulations, weather forecasting…

The craft of software development

- Client requirements are very different

- There is no standard process for software engineering

- There is no best language, operating system, platform, database system, development environment...

- The craft of software development is

  to select **appropriate methods** for each project

  and to **apply them effectively**

1. Introduction to Software Engineering

(end of lecture)

ONE LOVE. ONE FUTURE.