



HUST

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

ONE LOVE. ONE FUTURE.

The background of the slide is a dark blue field filled with a pattern of red dots. These dots are arranged in a way that they form a large, stylized circular shape in the center, with the density of the dots being higher in the center and tapering off towards the edges. The dots are of varying sizes, creating a textured, digital effect.

SOICT

School of Information and Communication Technology

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IT3180 – Introduction to Software Engineering

1 – Introduction to Software Engineering

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SO ARE YOU A NEWBIE, PROGRAMMER, DEVELOPER, OR SOFTWARE ENGINEER?



NEWBIE

IN THE LEARNING
STAGES, ABLE TO
WRITE SIMPLE
HELLO WORLD APPS



PROGRAMMER

ABLE TO WRITE SIMPLE
ALGORITHMS TO SOLVE
SIMPLE PROBLEMS, MORE
THEORETICAL THAN PRACTICAL



DEVELOPER

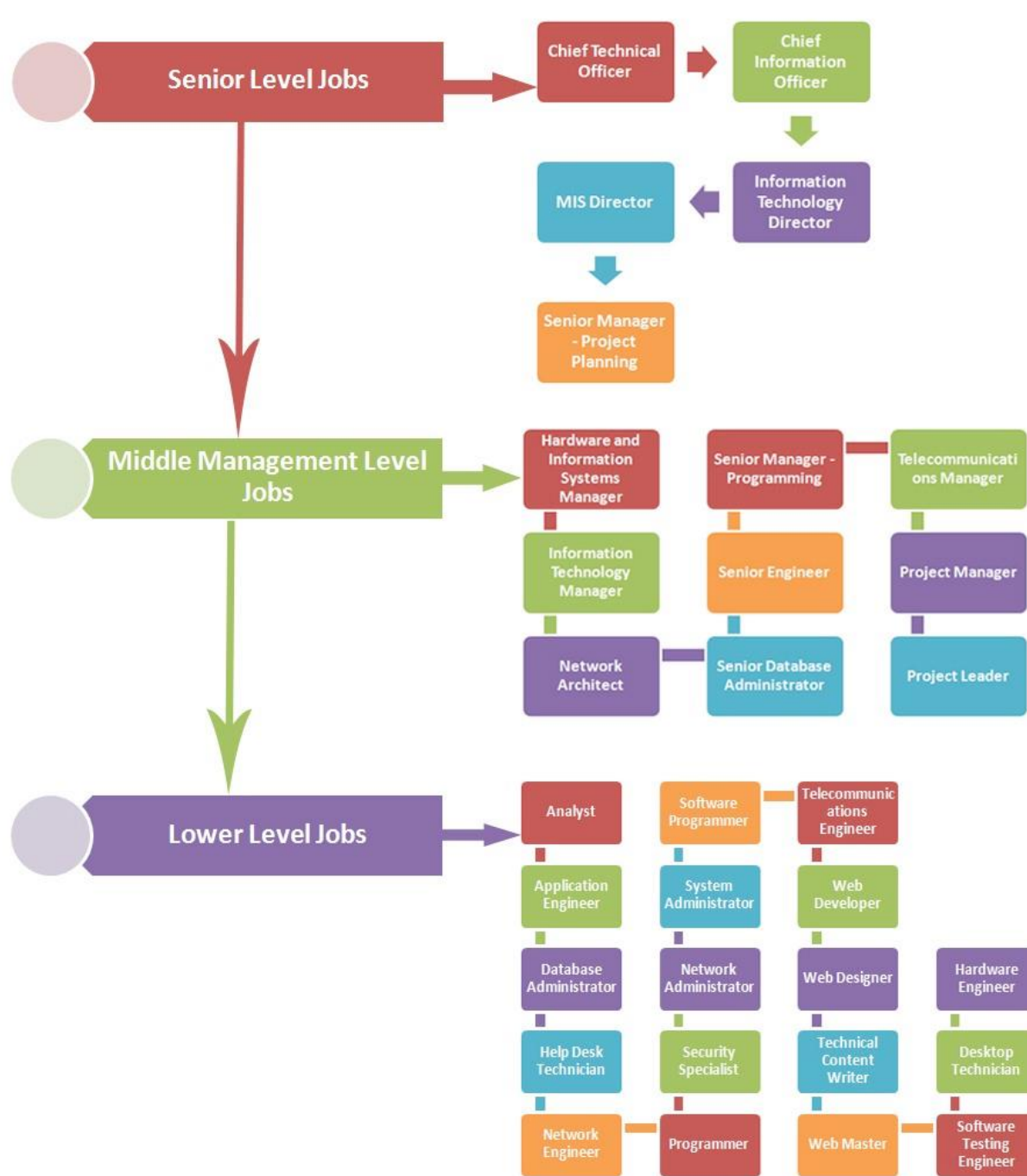
ABLE TO CREATE APPLICATIONS
THAT ARE USABLE, OFTEN
MAKES A LIVING SELLING
WRITTEN APPLICATIONS



SOFTWARE ENGINEER

ARCHITECT SOLUTIONS,
BUILD SYSTEMS AS WELL AS
WRITE CODE TO BUILD
SCALABLE APPLICATIONS

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ICT job positions

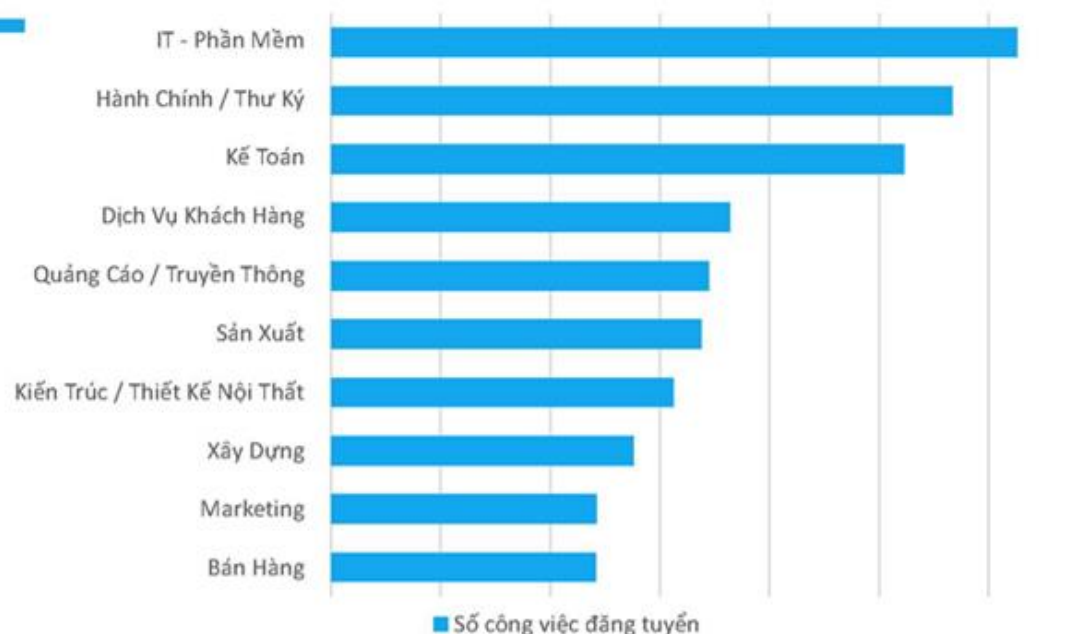
Top 10 Best Jobs in America in 2019

Rank	Job Title	Median Base Salary	Job Satisfaction	Job Openings
1	Data Scientist	\$108,000	4.3	6,510
2	Nursing Manager	\$83,000	4.0	13,931
3	Marketing Manager	\$82,000	4.2	7,395
4	Occupational Therapist	\$74,000	4.0	17,701
5	Product Manager	\$115,000	3.8	11,884
6	Devops Engineer	\$106,000	4.1	4,657
7	Program Manager	\$87,000	3.9	14,753
8	Data Engineer	\$100,000	3.9	4,739
9	HR Manager	\$85,000	4.2	3,908
10	Software Engineer	\$104,000	3.6	49,007

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Vietnam industry demands 2019

TOP 10 NGÀNH CÓ NHU CẦU TUYỂN DỤNG CAO NHẤT



Theo Báo cáo Thị trường nhân lực ngành
Công nghệ thông tin 2019 - Vietnamwork

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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

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**?

Why apply Software Engineering to Systems?

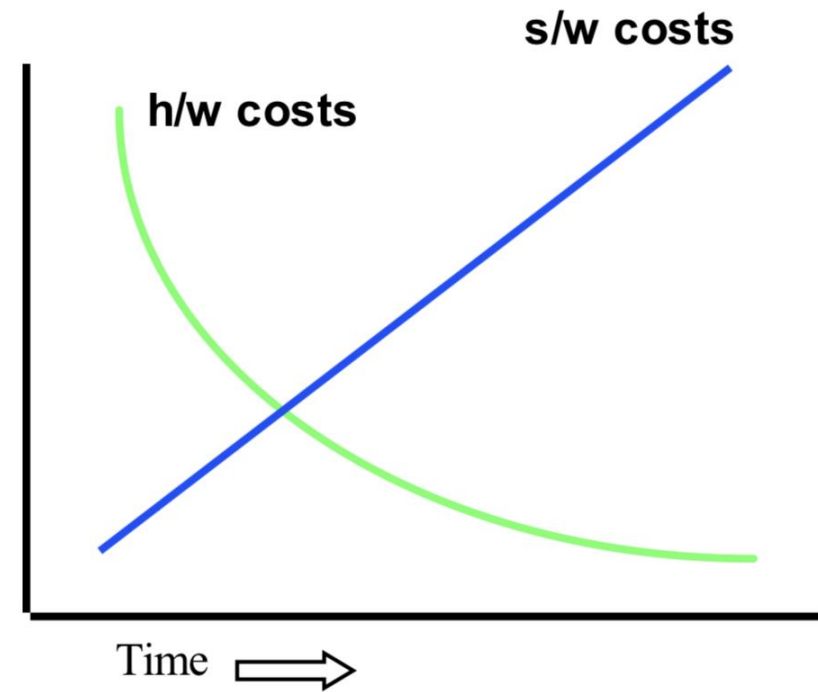
- Provide an **understandable process** for system development
- Develop systems and software that are **maintainable** and **easily changed**
- Develop **robust** software system
- Allow the process of creating computing based systems to be **repeatable** and **manageable**

- 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: autonomous vehicles, new security awareness
- 2020s: AI everywhere

Hardware costs vs Software costs (% of overall cost)



Why is software so expensive?

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 marketing after release
- ... and the most important thing:

Software has to be supported 24/7
Software needs to be updated

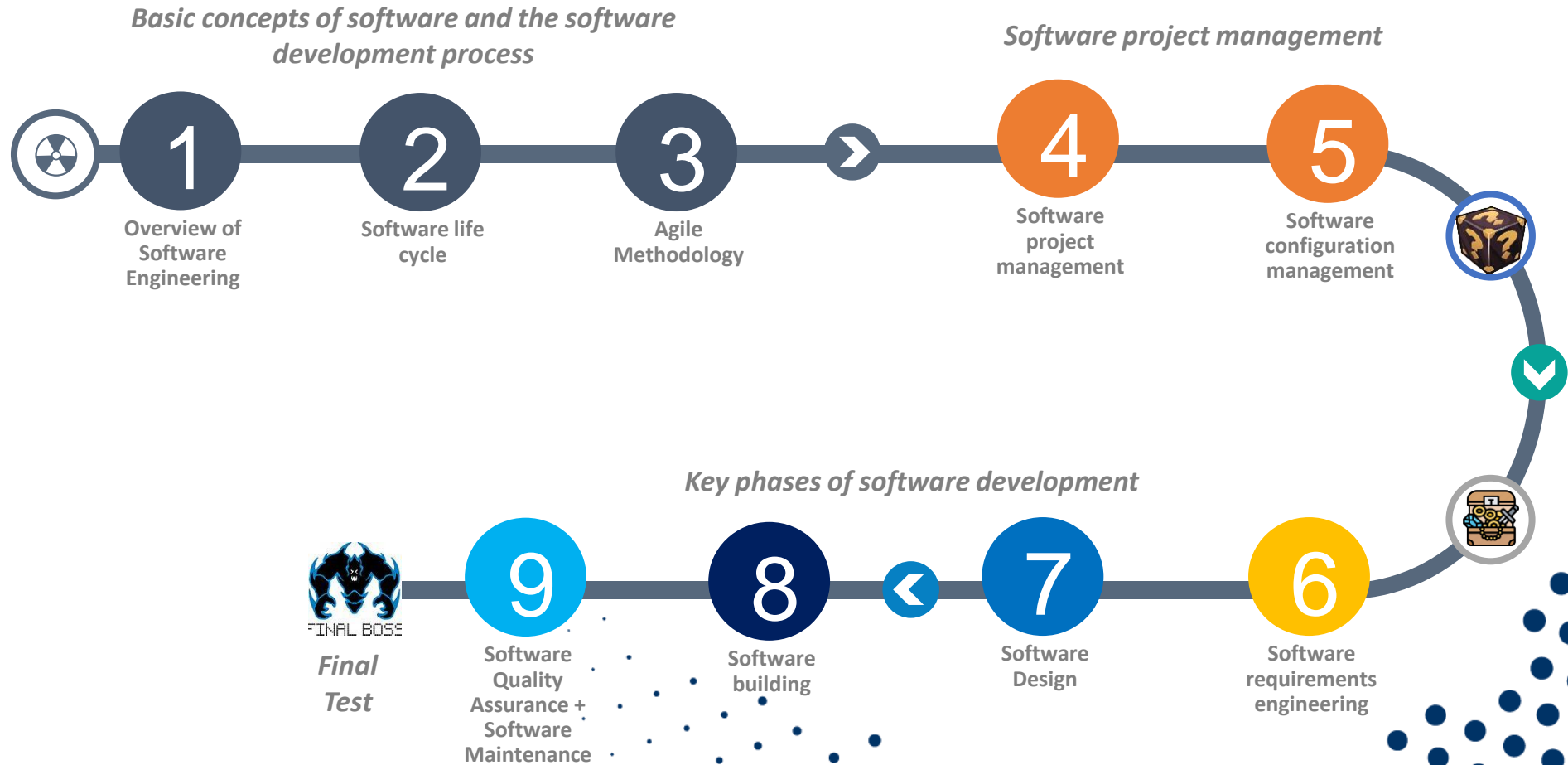
Variety of Software Products

- **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 traffic 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**

Learning path



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- Course book:
 - R. Pressman, Software Engineering: A practitioner's approach, 8th Edition, McGraw Hill 2016
- Slides:
 - Roadmap
 - Slides
 - Lab guides
 - Videos
- References
 - I. Sommerville, Software Engineering 10th Edition, Addison Wesley 2017



1. Introduction to Software Engineering

(end of lecture)

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