操作系统之哲学原理

Philosophical Principles of Operating Systems

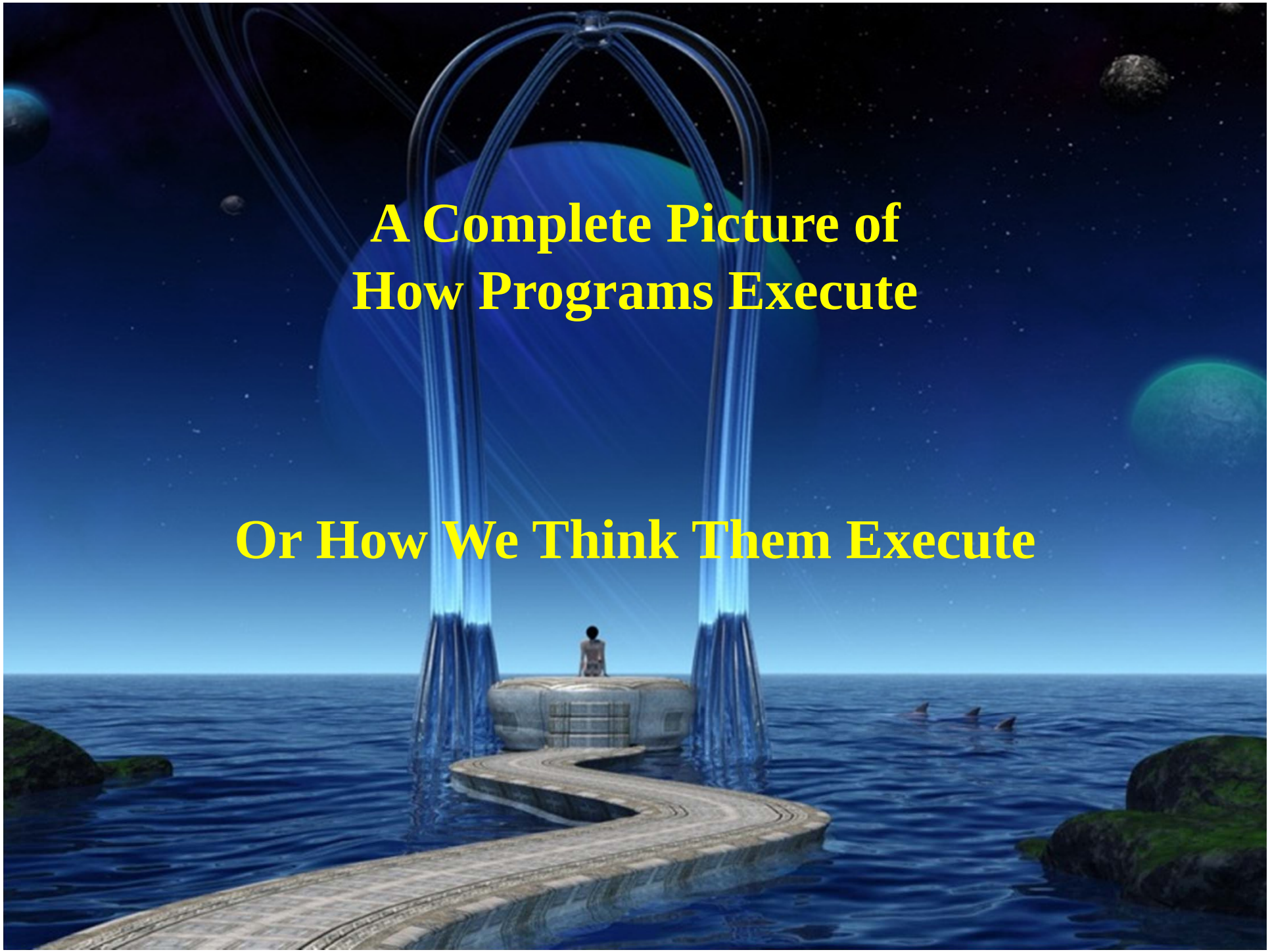
In Pursuit of Absolute Simplicity 求于至简，归于永恒

A Question to Ponder

- Why cannot China produce a commercial operating system?
- People say that China started much later in OS R&D
- But is this is myth?

- Can you find a way to this dilemma?

- Or do we have a need to solve the problem
- This is the question you keep thinking during the course.


A Complete Picture of
How Programs Execute
Or How We Think Them Execute

给儿子的信

经上写着：‘做工懈怠的，与浪费人为弟。’最近，我发现你过着放荡和懈惰的生活、更喜欢放纵而不受约束、更喜欢玩乐而不去学习。当其他人埋头苦读的时候，你却在弹着吉他；在你读一卷法律书籍的时间里，你那些更加刻苦的伙伴们已经读完了好几卷。因此，我要力劝你从放荡和漫不经心中幡然悔悟，这样你就不会再被人称为一个‘浪费人’，而你的耻侮也可以转变为美名

-公元十世纪，一个父亲写给求学在外的儿子的信

Instructor Information

- Hengming Zou
  - ⇒Ph.D.: University of Michigan-Ann Arbor
  - ⇒M.S.: Institute of Computing Technology, CAS
  - ⇒B.S.: Huazhong University of Science and Technology
- 8+ years work experience in US software industry
  - ⇒IBM, National Data Corporation, Lucent, EMC
- Research interests:
  - ⇒Reliability, Availability, and Secure Storage

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教材的选择

快起！我的朋友，丢开你的书本；
否则，我敢确定你将变成驼背；
快起！我的朋友，清晰你的面容；
为何满是辛劳和困顿？

…

书！是愚蠢而又无休止的争吵；

…

够了，那些科学和艺术；
盖上那空洞乏味的书页；
来吧，带上你的心灵
一颗愿观察愿接纳的心灵。

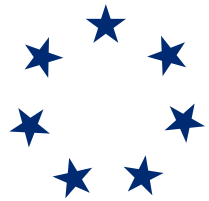
William Wordsworth
英国浪漫主义诗人代表

Textbook

- 计算机的心智：操作系统之哲学原理
  - ⇒Publisher：机械工业出版社

- Reference Book:
- Modern Operating Systems, 3e, by Andrew Tanenbaum
- Operating Systems Concepts by A. Silberschatz et al.
  - Addison Wesley
- Distributed Systems: Concepts and Design By George Coulouris

Grading System



- Home work and quizzes:
  - ⇒ACM: 30% School of Software: 15%
- Projects (4):
  - ⇒ACM: 00% School of Software: 35% (5, 10, 10, 10)
- Final exam:
  - ⇒ACM: 50~70% School of Software: 50%
- Course essay:
  - ⇒ACM: 00~20% School of Software: 00%

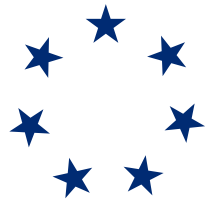
Content of Instruction

- Introduction
- Processes/threads
- Memory management
- File systems
- Input/output

Look Ahead: Introduction

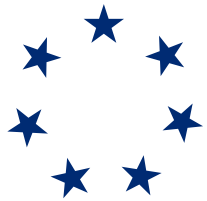
- Philosophy of computer (science)
- What is operating system
- Why study operating system?
- History of operating system
- Main operating system concepts

Look Ahead: Processes & Threads



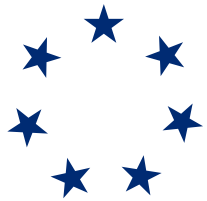
- Processes
  - ⇒Inter-process communication
- Threads
  - ⇒Thread synchronization
  - ⇒Lock Implementation
- CPU scheduling

Look Ahead: Deadlocks



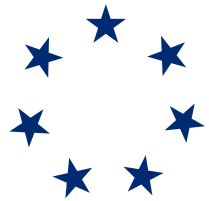
- Resource
- Deadlocks and its modeling
  - ⇒Resource trajectory
- Deadlock detection and recovery
- Deadlock avoidance and prevention
  - ⇒Banker’s algorithm

Look Ahead: Memory Management



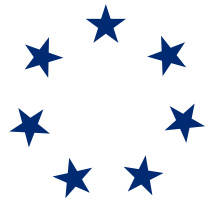
- Basic memory management
- Virtual memory
- Paging systems
- Segmentation systems

Look Ahead: File Systems



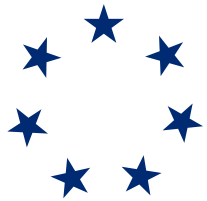
- Files
- Directories/folders
- File system implementation
- File system performance
- Example file systems

Look Ahead: Input/Output



- Principle of IO hardware/software
- IO software layer

What Is and Isn't About



- This course is about:
  - ⇒Common principles of all operating systems
  - ⇒Common problems and solutions to all OSs
  - ⇒General agreed practice in OS development/design
- This course is NOT about:
  - ⇒Specifics of any commercial OSs
  - ⇒Any data structure concerning any OS
  - ⇒Algorithmic implementation of any OS
- For this, you need Operating System Engineering

Homework #1

- Send an email to me with the following information:
  - ⇒Your name and age
  - ⇒Your background
    - →Where are you from, What do your parent do,
    - →What do you like the most so far in your life
  - ⇒What do you expect from the course
  - ⇒A one sentence of humor (try your best to amuse me)
- Due date: one week from today

Course Essay (1000~1500 words)

- Discuss your thoughts on this course, this subject
  - ⇒Do you like the course and the subject? Why or why not?
- Any reflection, comments, and suggestions
- Artes, Scientia, Veritas

Questions?

Then Ask!

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Let The Funs Begin