



Advanced Network Computing

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Course info

- Course ID: 20006027
- Credits: 2
- Class hours: 40
- Schedule: Week 1-10, Tue (1, 2), Thu (3, 4)
- Instructor: Ruini Xue (薛瑞尼)
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- Grading
 - 10%: class participation
 - 40%: term project
 - 50%: final examination



Class Participation: 10%



- Be present
- Raise your hand and challenge
- Paper reading and presentation
 - any interesting and/or famous paper, or survey by yourself.
 - present in English with slide
 - project team, no more than 5, **one** group / week.
 - so, no more than 10 groups → First come, first serve.
 - You can tell me your topics later.
- What are the prizes?
 - **Full marks** (10%) for all group members
 - Vote for the top 3 groups. Special gifts!



Term Project: 40%

- Address an unsolved issue in network computing areas.
- Each team ≤ 5 members. The team lead will get the highest grade, and other members will be 5x-points less.
 - 3 members in a group, [A, B, C], where A is the team lead and his/her grade is g , the grades of B and C are $g-5$ and $g-2 \times 5$, respectively. So, DO LIST MEMBERS IN ORDER.
- Submit both a prototype system and a report.
 - Report: no less than 30,000 characters in Chinese, or 10,000 words in English.
 - organized according to the conventions of academic papers.
- Any group finished the project before the last week could ask for 10-15 min presentation, either in English or Chinese → mark: 35+

How to submit term project?



- Learn git and the workflow on github.
 - <https://education.github.com/guide#5-get-started-with-git-and-github>
- Create an account in github.com
- Click the project link to create your own repo in the class organization
 - <https://classroom.github.com/group-assignment-invitations/b3fc2565f028d4518af21e8b367aeba1>
- Work on your project and submit according to the instructions
- [online explanation]



Final exam: 50%

- 90 mins
- Completion
- Mechanism description / comparison
- Computation
- Design
- Any suggestion?



Claim, the baseline

- No plagiarism!
- Submissions of high-degree of similarity: 0!



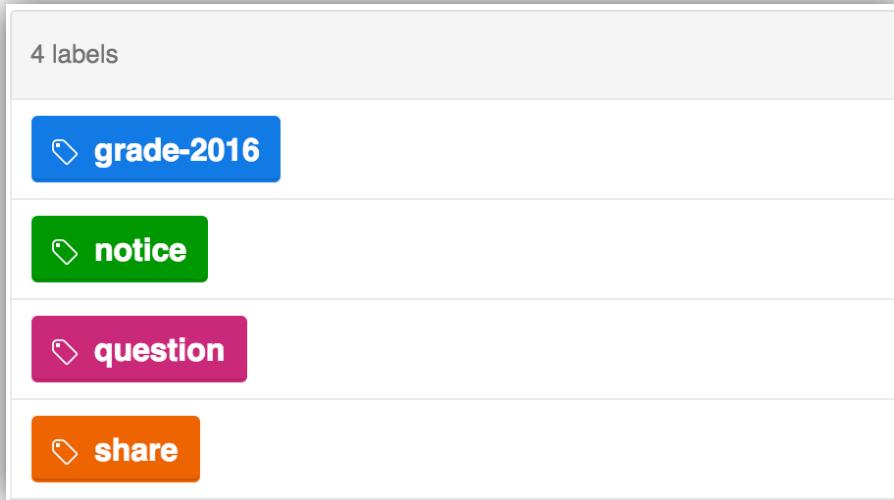
Goals

- Help students to
 - understand the development of network computing,
 - key points and key issues of the various network computing paradigms,
 - be exposed to a number of open research questions,
 - and, get involved into the topics related to his/her research.
- Prerequisite
 - OS, Software Engineering, Computer Network, Database, C/Java, and one of Python, Ruby, PHP.
- Course Resource (syllabus, slides, and projects)
 - <https://github.com/anc-uestc>



Discussion

- QQ Group: 494976208
- <https://github.com/anc-uestc/syllabus/issues>





Syllabus

- Enterprise Computing
- Parallel Computing
- Grid Computing
- Peer-to-Peer Computing
- Cloud Computing
- Pervasive Computing
- Internet of Things
- Social Computing



This course

- focuses on engineering techniques, trade-off designs instead of mathematic deduction,
- encourages discussion and communication instead of uni-directional propagation,
- expects high-level self-motivation instead of frequent pushing, though high-level term projects are forced,
- hopes everyone may enjoy it!



Textbooks and References

- Kai Hwang, Jack Dongarra, Geoffrey C. Fox. *Distributed and Cloud Computing: From Parallel Processing to the Internet of Things (1st Edition)*. Morgan Kaufmann, 2011
- Samuel Greengard. *The Internet of Things*. The MIT Press. 2015.
- Michael J. Kavis. *Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS) 1st Edition*. Wiley, 2014
- Thomas Erl, Ricardo Puttini, Zaigham Mahmood. *Cloud Computing: Concepts, Technology & Architecture (1st Edition)*. Prentice Hall, 2013



Introduction

what do you think *Advanced Network Computing* address?

This decade we will create and extend computing technology to connect and enrich the lives of every person on earth.



移动互联网研究报告摘要

- 财富的创造和消亡是新的计算产品发展周期的实质 – 我们现在已经进入移动互联网周期的早期阶段，这是过去的 50 年来的第 5 个发展周期。
- 移动互联网的发展速度快于桌面互联网，并且其规模将大得超乎多数人的想象，因为它代表着 5 大趋势的融合（3G + 社交 + 视频 + 网络电话 + 日新月异的移动装置）。
- 苹果公司目前在移动创新和影响力方面居于领先地位，但应用产业生态系统的深度、用户体验和定价将决定谁是长期赢家。
- 改变游戏规则的通信/商务平台（社交 + 移动平台）正飞速涌现。
- 海量数据增长推动运营商/设备走向转型。
- 新兴市场存在众多很有吸引力的机会。
- 日本的移动互联网和全球的桌面互联网为我们提供了未来移动互联网的发展/货币化路线图。

技术发展周期一般会持续十年的时间
技术发展周期已在 2 年前进入下一个重大计算产品发展周期，
即“移动互联网”发展周期

大型机

时代

上个世纪 60 年代



小型机

时代

上个世纪 70 年代



个人电脑

时代

上个世纪 80 年代



桌面互联网

时代

上个世纪 90 年代



移动互联网

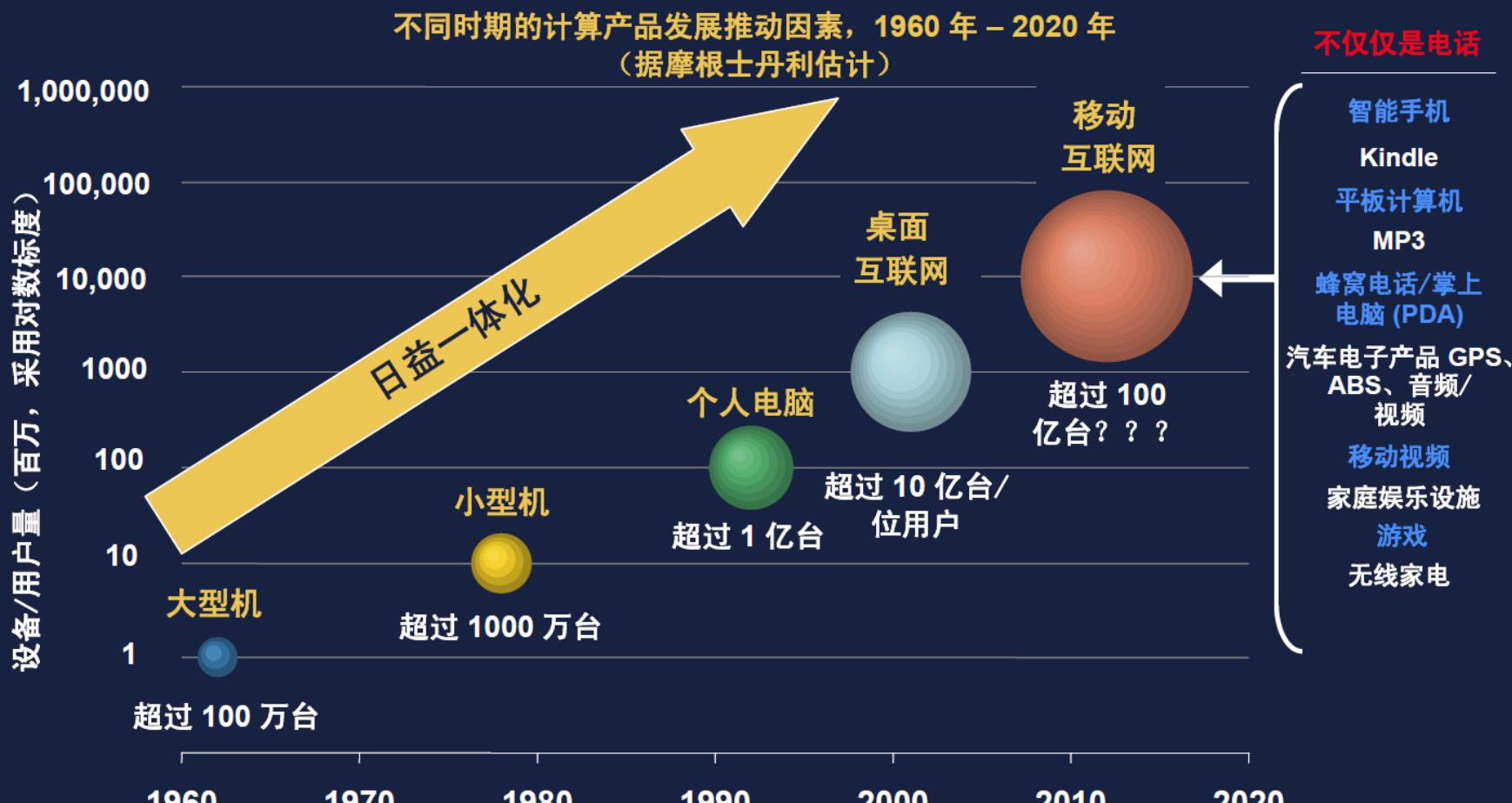
时代

本世纪最初 10 年



新计算产品发展周期的特征

借助更强的处理能力 + 改进的用户界面 + 更小的外形 + 更低的价格 + 扩展的服务减少
使用摩擦 = 10 倍的设备销售量



每个新周期的赢家往往都会比之前周期的赢家创造更多市值





技术财富创造/消亡周期

新的公司通常成为新发展周期中的最大受益者，而现在的赢家则往往走向下坡路



摩根士丹利

注：上个世纪 50 年代至 80 年代的赢家基于财富 500 强排名（按收入），桌面互联网时代的赢家基于从 1995 年到各自的最高市值时期所创造的财富。资料来源：FactSet、《财富》、摩根士丹利研究部。

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Network Era



- Everything could be connected
 - mobiles, pads, glasses, watches,
 - all embedded devices
- Everything is in the cloud
 - cloud computing, storage
- Network is everywhere
 - WiFi、3G、4G、LTE
- **How to address all these challenges?**



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Computing

- Computing is any goal-oriented activity requiring, benefiting from, or creating algorithmic processes—e.g. through computers.
- Computing includes designing, developing and building hardware and software systems; processing, structuring, and managing various kinds of information; doing scientific research on and with computers; making computer systems behave intelligently; and creating and using communications and entertainment media.

—wikipedia

Network



- a number of computers and other devices that are connected together so that equipment and information can be shared.

——*Merriam-Webster*

- Typical network application elements
 - socket / bind / listen / connect / accept
 - select / poll / epoll / kqueue
 - rpc / message queue

Advanced



- greatly developed beyond an initial stage
- much evolved from an early ancestral type

——*Merriam-Webster*

- So, we are going to talk about ***computing paradigms*** of great popularity, flexibility, and cost-effectiveness derived from the basic network programming elements, the ***design rationales*** behind them, as well as ***their applications*** in the real world.

Buzzwords

