



# 算法设计与分析

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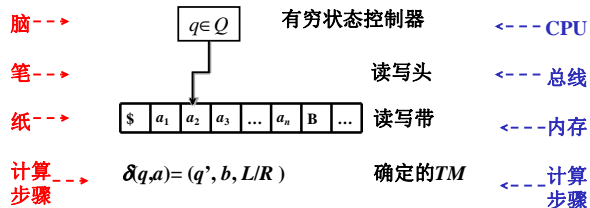


## Information about Class

- Class News
  - Will be posted by Internet
  - Please give me your email addresses
- Class Materials
  - You will find them in address:  
乐学网-算法设计与分析
- Homework and Exam.
  - Experiments: 20%
  - homework+Final Exam: 80%



## 图灵机



一个图灵机就是一个程序

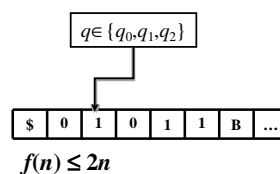
计算问题不同, 图灵机就不同

存在模拟所有程序运行的通用图灵机,  
其硬件实现即计算机



## 例

实现二进制计数器加1的图灵机

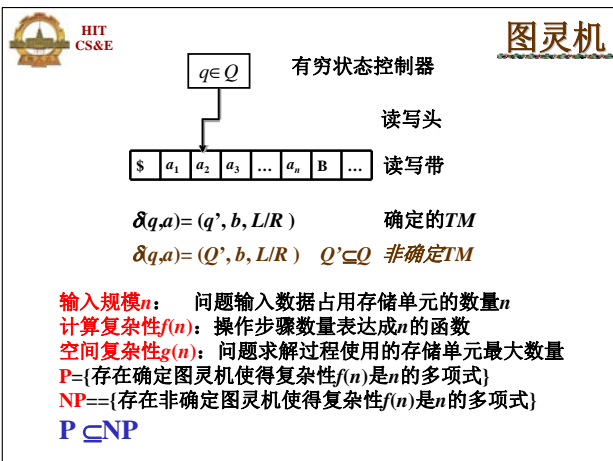


$\delta(q_0, \$) = (q_0, \$, R)$   
 $\delta(q_0, 0) = (q_0, 0, R)$   
 $\delta(q_0, 1) = (q_0, 1, R)$   
 $\delta(q_0, B) = (q_1, B, L)$   
 $\delta(q_1, 1) = (q_1, 0, L)$   
 $\delta(q_1, 0) = (q_2, 1, L)$   
 $\delta(q_1, \$) = (q_2, \$, R)$

用图灵机求解问题

确定问题求解过程的所有状态  
状态间的转移关系

与编程求解问题非常相似



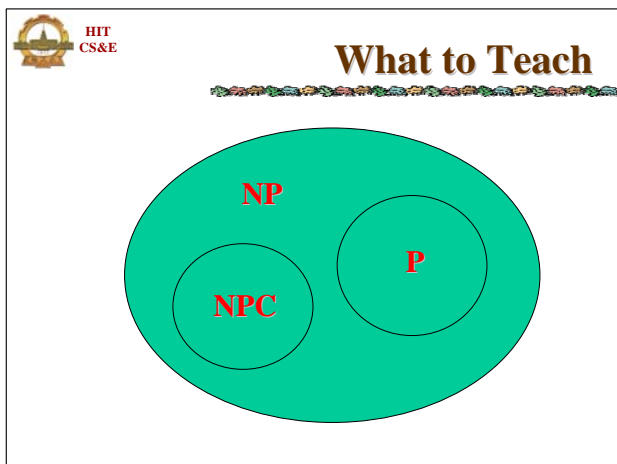
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## P=?NP

**NP-也称NP完全问题**

- NP中的一些问题构成的集合
- 只要其中一个问题存在多项式时间算法, 则 $NP=P$

美国麻省Clay数学研究所悬赏100万美元求解 $P=?NP$



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## 课程大纲

• 第一章. 绪论	(2学时)
• 第二章. 数学基础	(2学时)
• 第三章. 分治算法	(3学时)
• 第四章. 动态规划	(3学时)
• 第五章. 贪心算法	(3学时)
• 第六章. 平摊分析	
• 第七章. 搜索策略	(3学时)
• 第九章. 随机算法	(4学时)
• 第十章. 近似算法	(10学时)
• 第十一章. 在线算法	(2学时)

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## References

1. 骆吉洲, 算法设计与分析, 机械工业出版社, 2014
2. Thomas H. Cormen, Charles E. Leiserson, and Ronald L. Rivest. *Introduction to Algorithms*, The MIT Press, 第二版, 2002.
3. Sara Baase. *Computer Algorithms: introduction to design and analysis*. Pearson education press. Third Edition. 1999.
4. 王晓东, 计算机算法设计与分析, 电子工业出版社, 2001.

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## Good Books

1. D. E. Knuth等, *Art of the Computer Programming*, Vol. 3, Addison-Wesley, 1973.
2. A.V.Aho, J. D. Ullman等. *The Design and Analysis of Computer Algorithms*. Addison-Wesley, 1974.
3. A.V.Aho, J.D.Ullman 等. *Data Structures and Algorithms*. Addison-Wesley, 1983.4.
4. S. Baase, *Computer Algorithms: Introduction to Design and Analysis*. Addison-Wesley, second edition, 1988.
5. E. Horowitz and Sartaj Sahni. *Fundamentals of Computer Algorithms*. Computer Science Press, 1978.



### **Important Journals**

1. IEEE Transactions on Electronic Computers
2. IEEE Transactions on Software Engineering
3. IEEE Transactions on Data and Knowledge Engineering
4. Acta Informatica
5. SIAM Journal on Computing
6. Journal of Computer and System Sciences
7. Communication of the ACM
8. Journal of the ACM
9. BIT



10. Information and Control
11. ACM Computing Surveys
12. Mathematics of Computation
13. Information Processing Letters
14. Teoretical Computer Science



### **Important Conferences**

1. Annual ACM Symposium on Theory of Computing
2. Annual IEEE Symposium on Foundations of Computer Science
3. ACM Annual Computer Science Conference
4. Annual Symposium on Computational Geometry
5. ACM Symposium on Parallel Algorithms and Architectures.