SAINT 2008 Workshop: IT enabled Services (ITeS)

Possibility of Human Grid Computing for Artificial Intelligence Systems

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Outline

- Introduction
- Grid Computing
- Chess and Shogi
- Human Grid Computing
- Conclusion

Introduction

- Question
  - Can crowds of amateur players win against professional players?
  - If possible, how to do?

Grid Computing

- Computation by CPUs on the Internet
  - Numerical Simulation

    e.g. Phenomenon in physics and economics
  - Data Analysis

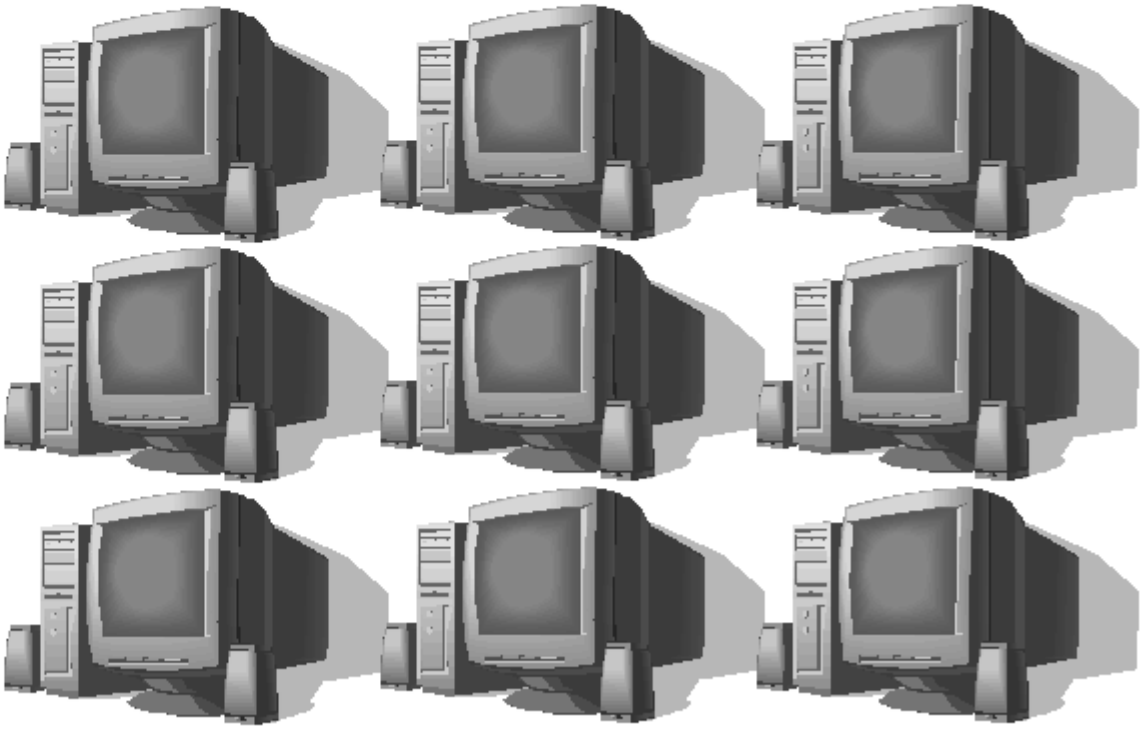
    e.g. Data mining and SETI@home project
- Inexpensive supercomputer

Grid System

jobs

user

computing resources



results

Grid Pool

Computer Chess

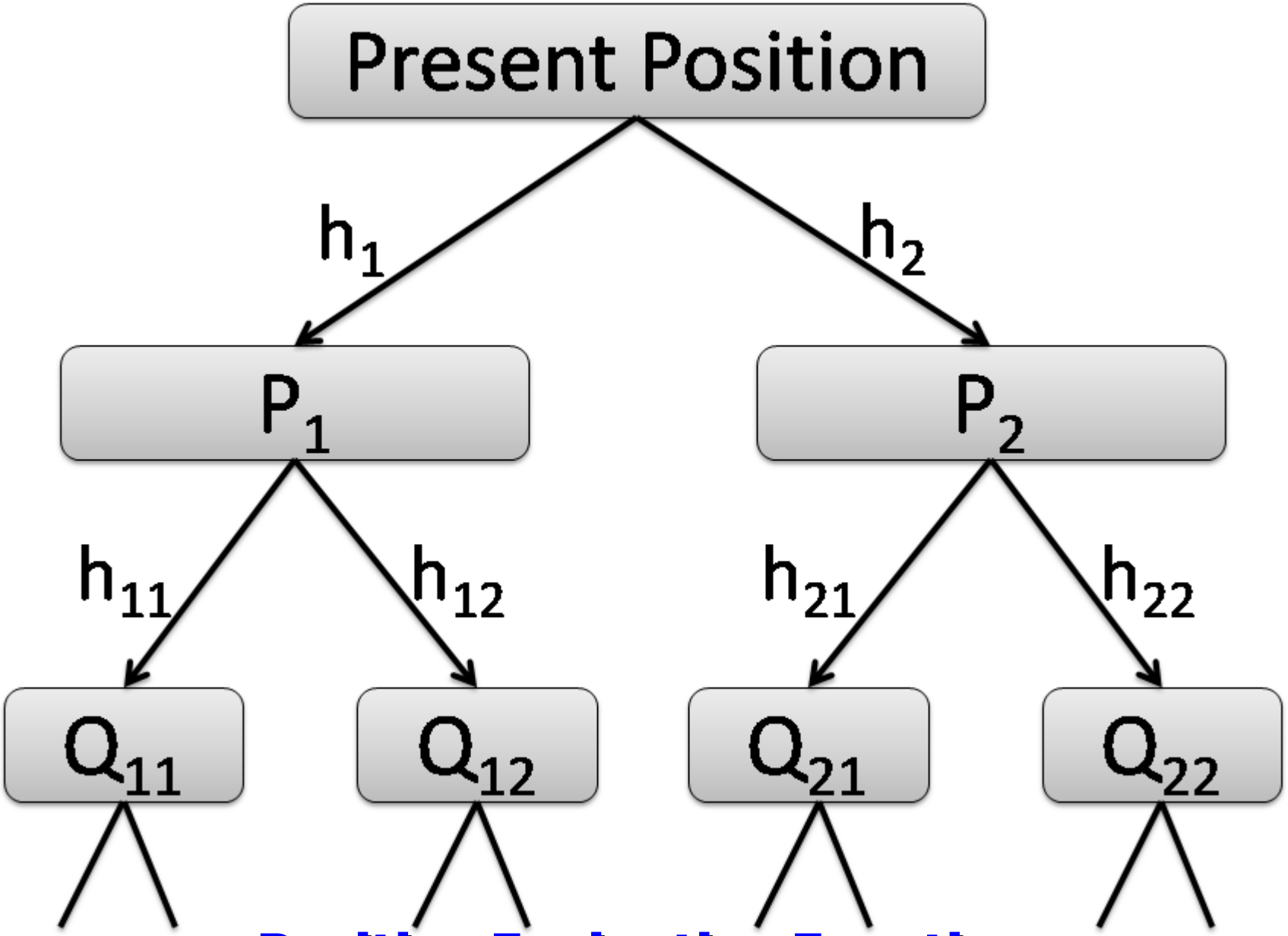
- Shannon (1950)
- Deep Blue (1997)
  - won against Garry Kasparov
  - 512 CPUs for optimized to play chess
  - 2×10^8 positions / second

Computer Shogi

- Computer Shogi System
  - equivalent to top-level amateur players
  - is considered to win against *Meijin* in 2015
- Complexity of game trees

game	scale
chess	10^{123}
Shogi	10^{226}
go	10^{360}

Game Tree



Position Evaluation Function

Difficulty in Algorithm

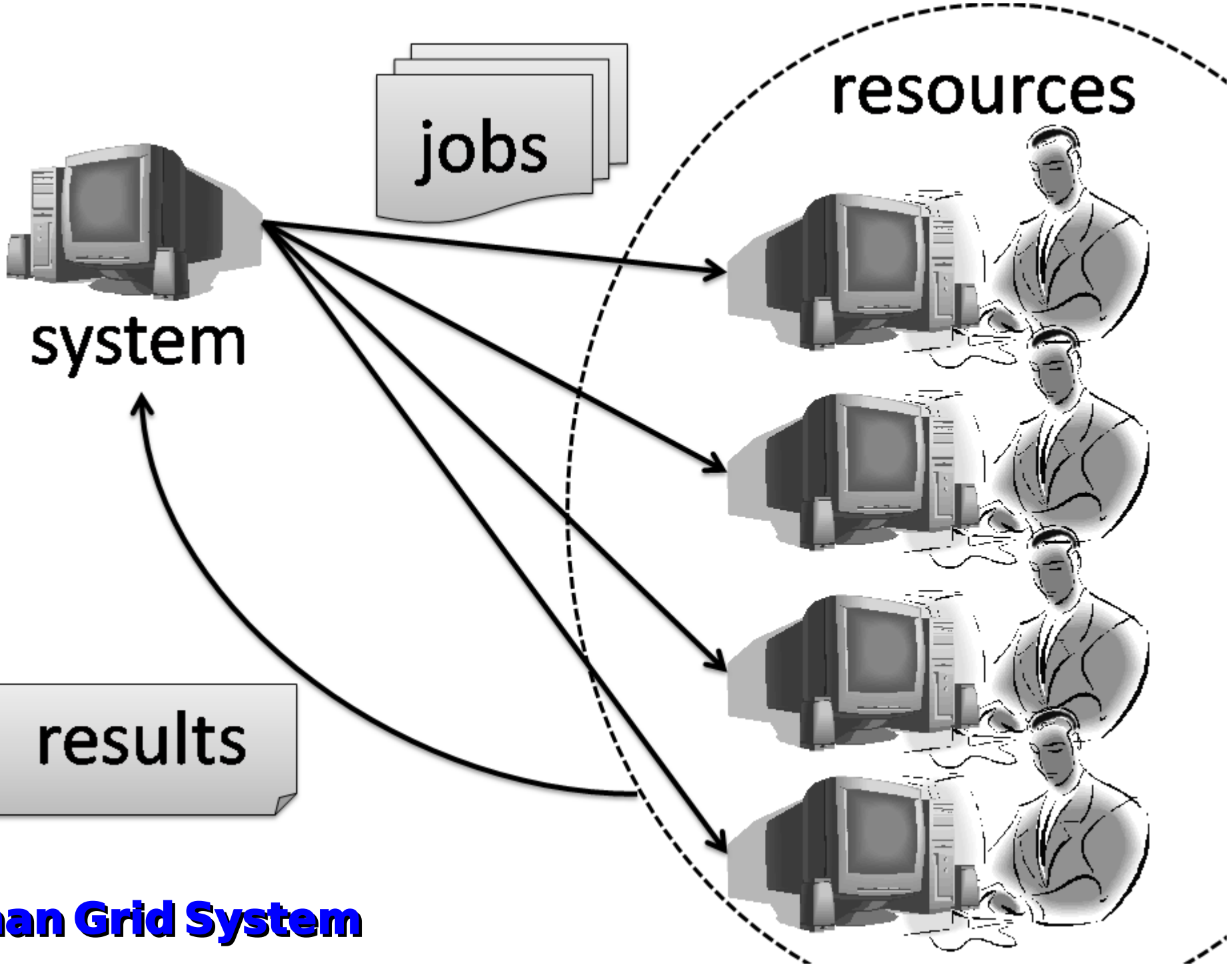
- Large-scale of game trees
- Min-Max method / Alpha-Beta cut
- Clearly misdirected search

Human Grid Computing

- Human assisted intelligence system
  - dismiss negative result quickly
  - Concept of Web 2.0

    The wisdom of crowds
  - Another evaluating function

    Who may give correct judge



Human Grid System

Conclusion, and more

- Human Grid Computing
  - is effective in large-scale search
  - enables Web 2.0 in Shogi
- Future Work
  - Implementation of Human Grid Systems