

Introduction

- Aim
 - Demonstrate how distributed computing relates to games
 - Consider large number of characters – scalable, relevant problem
 - Consider how spatial partitioning relates to load balancing

Motivation

- Concurrency prominent issue
 - Multi-core/multi-CPU hardware commonplace
 - Unable to reap benefits of Moore's Law
- Areas of relevancy
 - Simulation
 - Calculation – SETI@home etc
 - Game servers
- Problems with single servers
 - Difficult to scale
 - Power consumption regardless of use - cost
 - Geographically limited
- Real time vs. long term
 - Render farms common application, require hours per frame
 - Games often require fast responses
 - Increase issues with synchronisation, latency
- Specific problem
 - Dealing with individual characters in a 2d environment
 - Represents problems found in running games & handling other simulations
 - Basic crowd – common problem in games
 - Potential for expansion and extension

Research Question

How can the processing of autonomous characters in a real-time virtual environment benefit from parallelisation over multiple distributed computer systems?

Addressing the Question

- Architecture
 - MPI
 - Server & central DB, independent nodes
 - Visualisation per node
 - In an MMO clients may connect directly to each node?

- Parallelism
 - Task parallelism, possibly data parallelism
 - Amdahl's law
- Networking
 - Reliable connections, few packets (TCP-IP or UDP with additions)
 - Local network
- Characters
 - Autonomous characters
 - Pathfinding with “another task” (performing meaning less task once target is reached?)
 - Character-character collision could be considered to add data interdependency
- Load Balancing
 - Spatial partitioning of 2D world (Quad-tree)
 - Manage characters moving between nodes

Resources and Requirement

- Computers
 - Beowulf cluster ideal (need *NIX)
 - Lab computers fine too (Windows)
 - Multi-core CPU
 - LAN
- Software
 - .NET framework, Visual Studio
 - Additional libraries, nothing else should need installed