Software Praktikum (Advanced)

Alexei Bratuhin

Neighbourcast

Network Paradigm for MMORPGs

Index

- MMORPG
- Neighbourcast
- Test Results

MMORPG - Introduction

MMORPG (Massively Multiplayer Online Player Game)

- online
- real-time
- allows players to
  - interact with other players
  - explore the world
  - develop their character/avatar
  -
- extremely popular since broadband Internet
- millions of subscribers

MMORPG - Architecture

- Architecture
  - Client / Server (World of Warcraft, Everquest)
  - Thin Client
  - Maintenance requires sufficient servers and bandwidth
  - Commercial grade infrastructure requires ~100-1000 of servers
- Alternative Architecture
  - P2P + Tracker Server
  - Thick Client
  - Each client requires broadband Internet access

Neighbourcast - Introduction

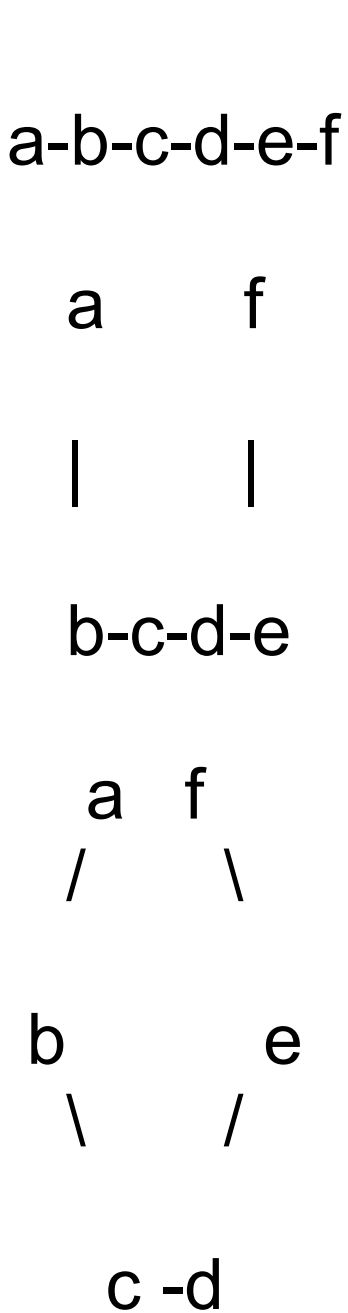
A node possibly doesn't need information about every other node.

- maintain a list of neighbours
- send information to tracker server
- send information to "neighbours" only

Neighbourcast - Overview

- send status messages to all nodes from neighbour list with
  - # forwarding hops = 0, if not moving
  - # forwarding hops = 1, if moving
- proceed incoming messages
  - if received message from node that is a neighbour and isn't in neighbourlist -> add node to neighbourlist
  - if received message from node that isn't neighbour and is in neighbourlist -> remove node from neighbourlist
- check if graph is still connected
  - if not, ask the server to build MST

Neighbourcast - Problem



If a chain, that is an MST itself, forms to build a circle, end nodes will never contain each other in their neighbourlist, althouhg being within each other's range

Neighbourcast - Enhancement

- Logarithmic TTL
  - Each messages is forwarded log(#Nodes) - #Neighbours times
- Probabilistic neighbour assignment
  - if neighbour leaves range, remove it from neighbour list with probability PROB
  - if not neighbour is not in range, add it to neighbour list with probability PROB
  - PROB =1 - 1/max(t-(c-l), 1)

Neighbourcast - Test Results

- Neighbourcast
  - small number of messages sent overall
  - many MST builds (~at every step)
  - small number of inconsistencies
  - negligible number of errors

Neighbourcast - Test Results

- Neighbourcast with Logarithmic TTL
  - small number of messages sent overall
  - many MST builds (~1/2 of steps)
  - small number of inconsistencies
  - negligible number of errors

Neighbourcast - Test Results

- Neighbourcast with Probabilistic neighbour assignment
  - highly parameter dependent
  - few MST builds
  - fewer inconsistencies
  - fewer errors
  - bad probability function

Source Code

Source code available from
http://kanji.googlecode.com/trunk/MMORPG