An implementation of multiplayer online game with distributed server architecture

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An Implementation of Multiplayer Online Game with Distributed Server Architecture

A thesis submitted in fulfillment of the requirement of the award of the degree

Master of Information and Communication Technology – Research

From

University of Wollongong

by

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and Computer Science
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Abstract

The distribution of game servers has received serious attention in recent years. A multi-server structure may distribute the load of the server, as well as improve the fairness of games played over large geographical distances without sacrificing delay. However, while distributing the game authority, the system takes risk of game state inconsistency between servers. Mechanisms are presented to provide synchronization between servers. However, user response to these mechanisms for maintaining server consistency in different game types is largely unknown.

This thesis aims to study the user responses to two of the important synchronization techniques, Local Lag and Timewarp, within a real network game. To do this we developed a platform based on a common First Person Shooter (FPS) game called Quake III Arena. The platform is able to simulate various distributed server systems. With the platform we examines the impacts of using local lag/timewarp upon computer-controlled players (bots) performance in distributed network game. According to our experimental results it is probable to gain the optimal point of bots performance with constant network lag while using Local Lag and Timewarp together.

To discuss the probable difference between human players and bots, and to examine the practicability of using the bot system to simulate human players’ behaviors, we perform experiments with the participation of human players, and compare the results between bots/human players performance while under the same network conditions. The two groups of results shows significant similarities.

Finally, in order to analyze and arrange the synchronization of distributed system more efficiently, we present Virtual Server Shifting Theory. We first demonstrate the
practicability of applying this theory within the distributed server system based on the mirrored server system, and then generalize the conclusions to more complex distributed server network topologies.
Statement of Originality

This is to certify that the work described in this thesis is entirely my own, except where due reference is make in the text.

No work in this thesis has been submitted for a degree to any other university or institution.

Signed

Dingliang Liang

15 September, 2006
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List of Abbreviations

bot     Computer-controlled Player
DR      Dead Reckoning
DVE     Distributed Virtual Environment
FPS     First Person Shooter
fps     frame per second
LAN     Local Area Network
MMORPG  Massive Multiplayer Online Role Playing Game
MOG     Multiplayer Online Game
TSS     Trailing State Synchronization