

Introduction to Networked Graphics

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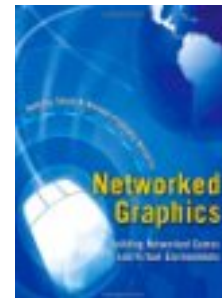
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Abstract

Our course will introduce attendees to best practice and recent advances in the networking of graphics applications. We take a broad view of networked graphics, including the domains of network games, virtual reality and networked simulations. We start by demonstrating why networked graphics applications have different requirements on the network compared to “normal” applications. We then pay particular attention to the issues of latency and scalability. We include some more detailed case studies including EA’s Burnout™ Paradise, Linden Labs’ Second Life and the DIS standard.

Materials

There is a new book on this topic: **Networked Graphics: Building Networked Virtual Environments and Network Games**, by Steed and Oliveira. The book has extensive coverage of the field and each chapter has a detailed bibliography covering practical implementation and state of the art research.



There is an accompanying website:

www.networkedgraphics.org

which has a blog with articles on networked graphics.

The materials for today are available on a pen-drive (please ask Anthony to copy them to your IEEE VR 2011 pen drive or any other media you have), or on the website. The materials include slides, case studies and tutorial notes. There is also a variety of example source code on the website.

[†] The IEEE VR 2011 will be presented by Anthony. Manuel assisted with the creation of the materials.

TimeTable

Session 1 (9:00 – 10:30)

Introduction

- What are networked graphics?
- Potted history of networked graphics

Networking Fundamentals

- Basic Internet technologies
- Basic networking strategies
- Why are all types of networked graphics “non-standard” networking applications?

Break (10:30 – 11:00)

Session 2 (11:00 –12:30)

Actual Internet Performance

- What bandwidth can we expect?
- Sources of latency
- What other issues must we consider?

Requirements and Constraints

- Requirements on consistency
- Requirements on latency
- User response to inconsistency and latency

Lunch (12:30 – 13:30)

Session 3 (13.30 – 15:00)

Latency

- Mitigation strategies
- Payout delays, local lag and dead reckoning

Scalability

- Management of awareness
- Interest specification
- Server partitioning
- Peer to peer networking

Break (15:00 – 15:15)

Session 4 (15:15 – 16:45)

Application Support

- Security
- Protocol decisions
- Persistence

Tools

- Middleware
- Networked engines

Research Issues

- Scalable peer-to-peer
- Thin clients
- Standards
- Etc.

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Contributor Biographies

Anthony Steed is a Professor at University College London. His research interests are in collaborative virtual environments, immersive virtual reality, interaction, and human animation. He has over 110 refereed conference and journal papers to date, and is author with Mel Slater and Yiorgos Chrysanthou of the Addison-Wesley textbook, *Computer Graphics and Virtual Environments: From Realism to Real-Time*. He was program chair of the 2007, 2008, and 2009 IEEE Virtual Reality conferences. For part of the academic year 2006 - 2007 he was on sabbatical to Electronic Arts in Guildford. He is also the director of the Engineering Doctorate Centre in Virtual Environments, Imaging, and Visualization.

Manuel Fradinho Oliveira is the research director of Cyntelix, and is responsible for the business development of several successful innovations. His research interests include collaborative virtual environments, immersive virtual reality, networked virtual environments, game design, human factors, and serious games. He has more than 70 refereed conference and journal publications to date. His PhD thesis focused on creating networked virtual environment systems, which yielded a patent addressing subjective network compensation techniques.

For any queries, please contact Anthony Steed:

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