

A Virtual World Distributed Server developed in Erlang as a Tool for analysing Needs of Massively Multiplayer Online Game Servers

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Erlang Training and Consulting Ltd
www.erlang-consulting.com

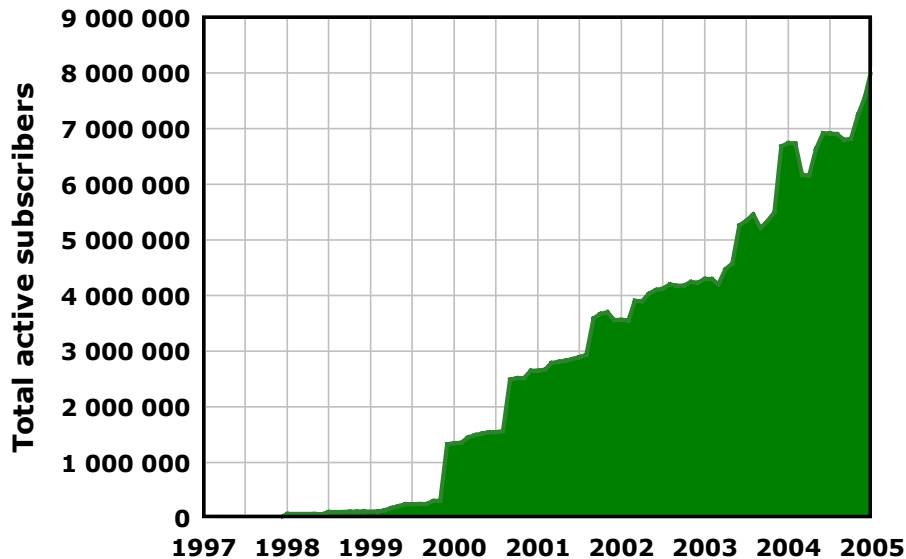
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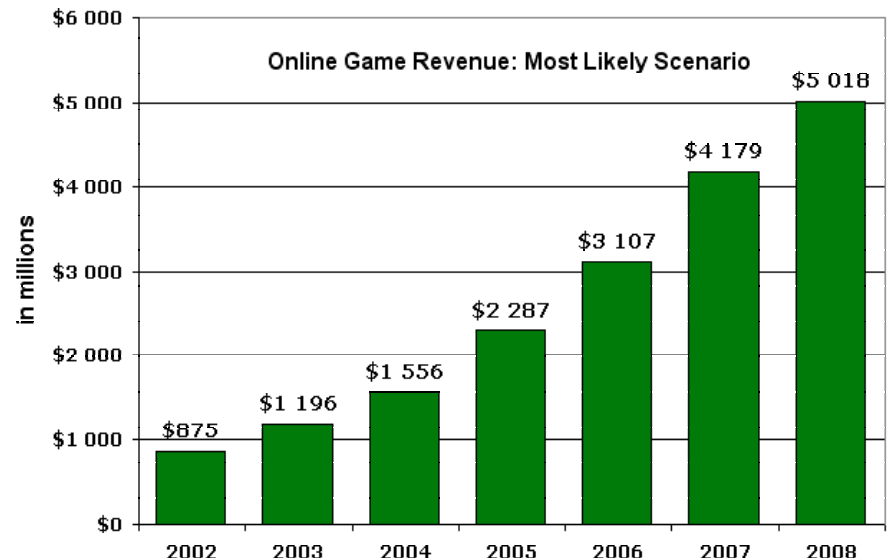
- **Massively Multiplayer Online Games**
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- **Client and server applications**
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Massively Multiplayer Online Games

- Significant increasing in number of active subscribers
- Fast growing online games market



Source: MMOGCHART.COM



Source: IGDA, "2004 Persistent Worlds White Paper"

Problems to solve

- **Big amount of data to process**
- **Frequent synchronisation**
 - *acceptable delay 150 - 500 ms*
- **Adaptation to the connection quality**
- **Limited opportunity for full testing with thousands of players during early phase of development**

Prototyping

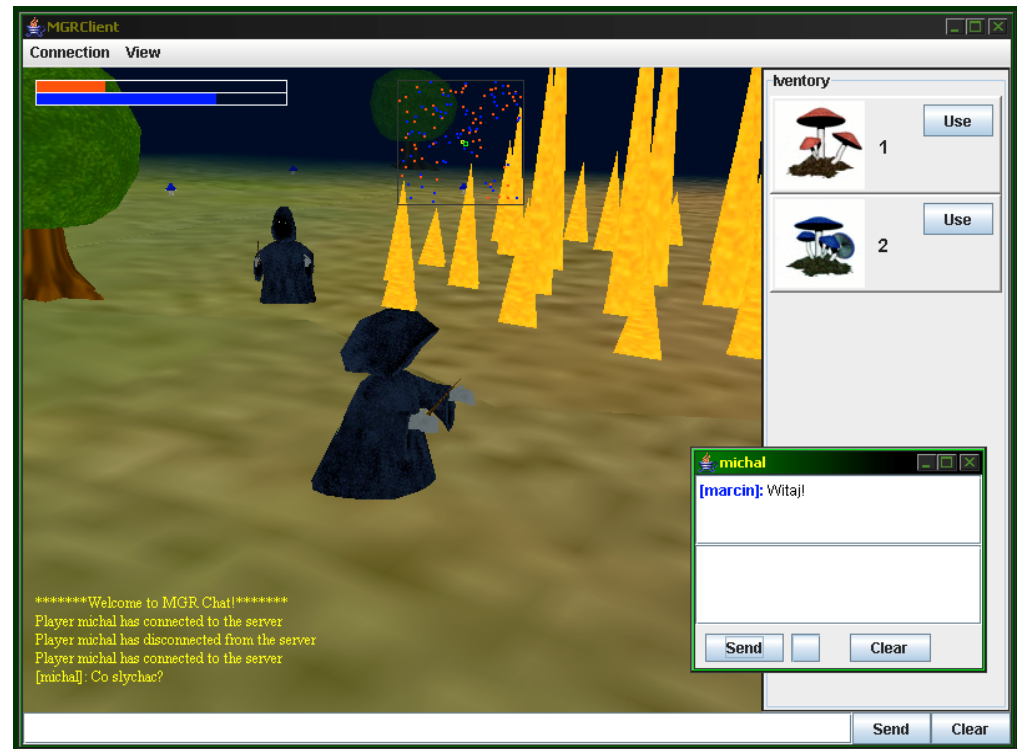
- **Experimenting with the functional and technical aspects**
- **Determining the scalability of the architecture**
- **Testing new solutions**

Using Erlang/OTP for the prototype

- **Open source**
- **Compatible with various platforms**
- **Concurrent oriented programming**
 - *one process for every connected player*
- **Efficient internal communication**
- **Supporting distributed applications**
- **Distributed database Mnesia**
- **Distributed load testing tool IDX-Tsunami**

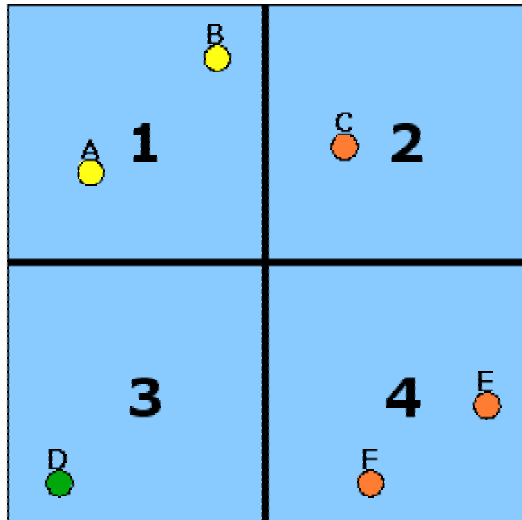
Client application

- Java + Java3D
- Actions:
 - *moving*
 - *collecting objects*
 - *magic*
 - *chat*
- **Player's state kept on the server**

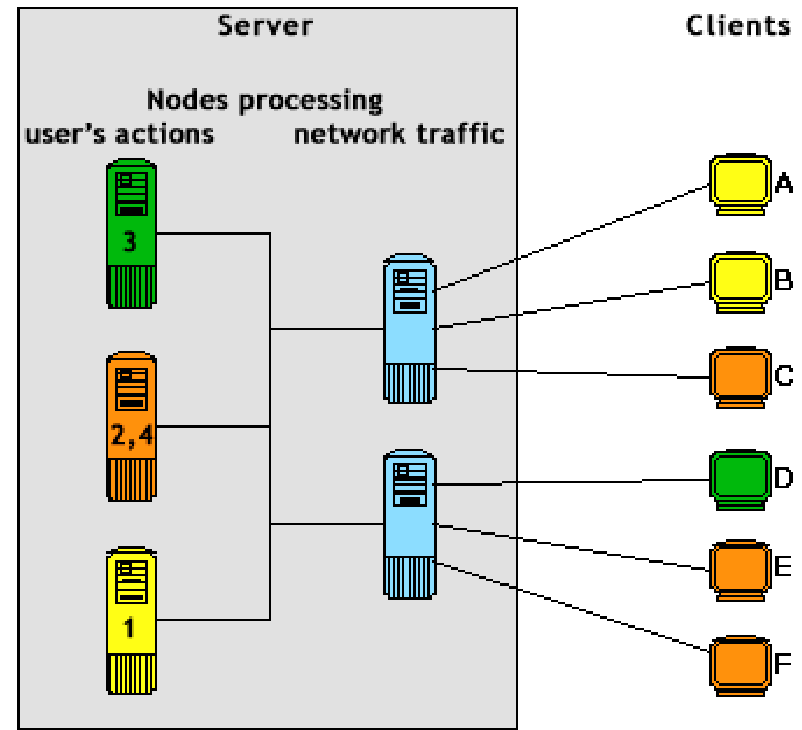


Server application

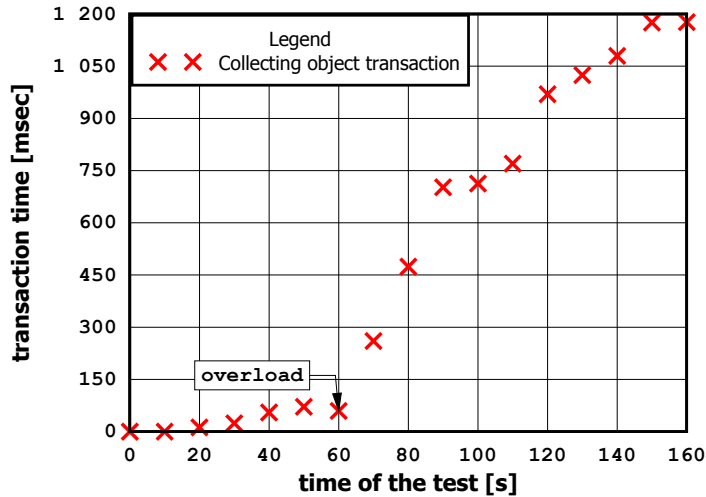
- The game terrain divided into zones
- Players placed within the same zone are processed on the same node



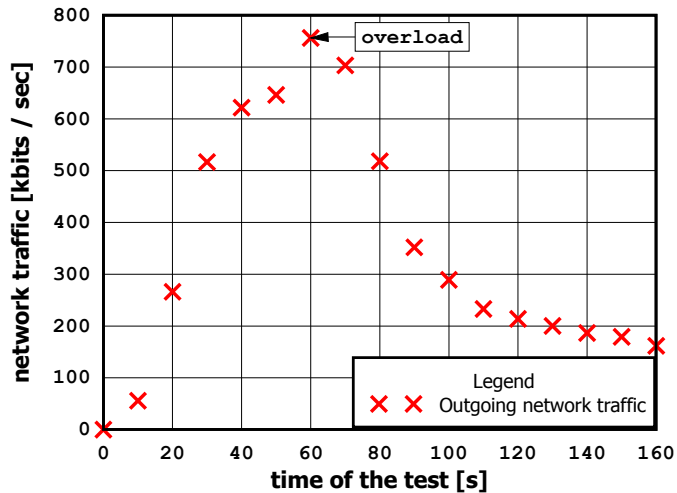
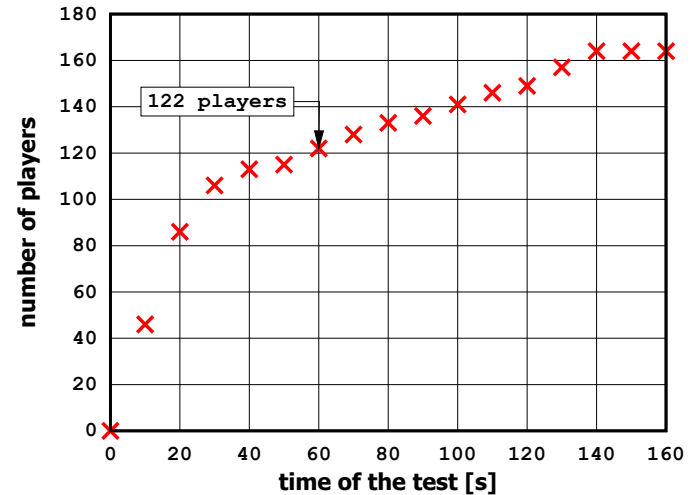
- Server distributed on a cluster of machines



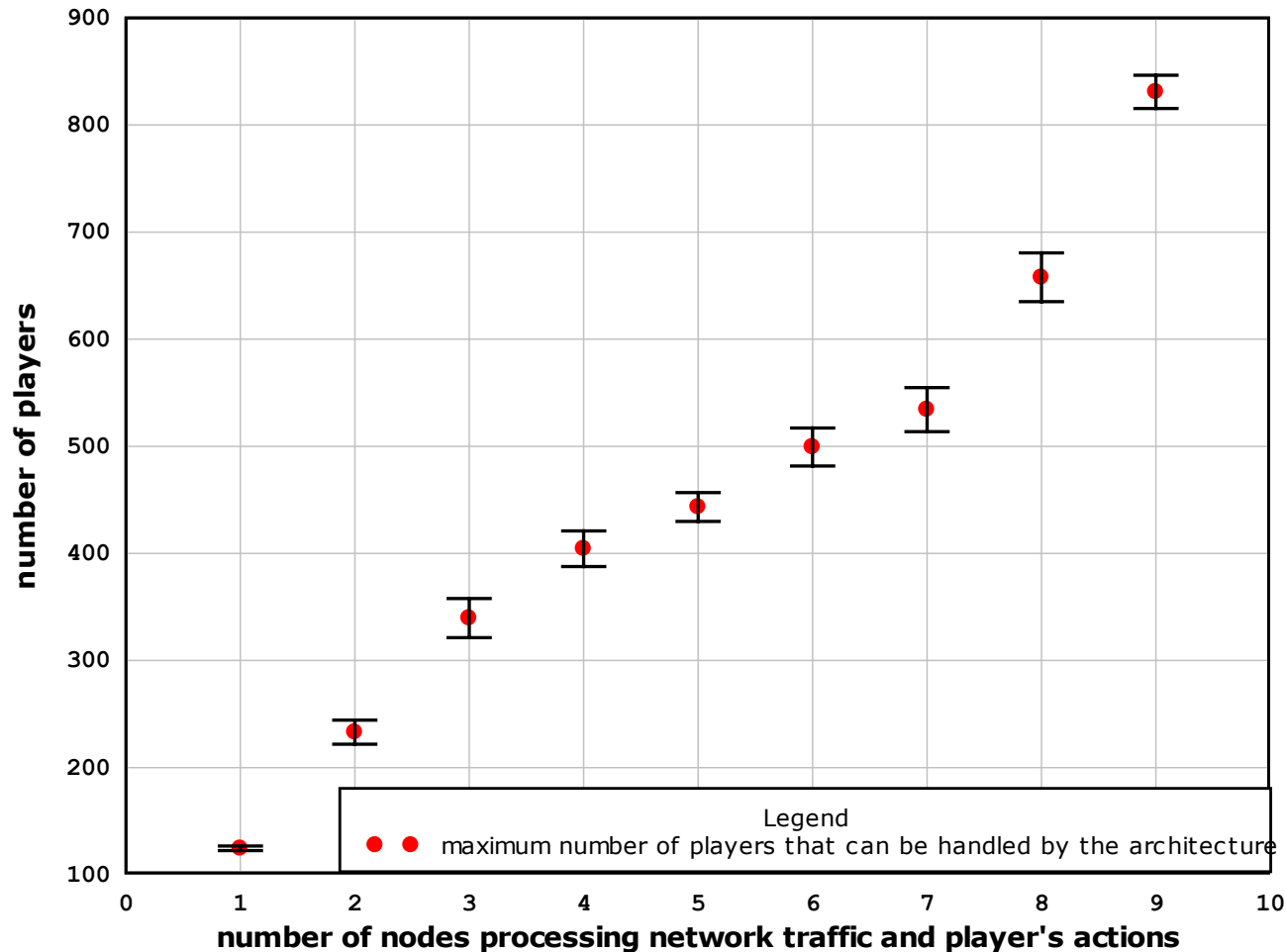
Determining the maximum number of users



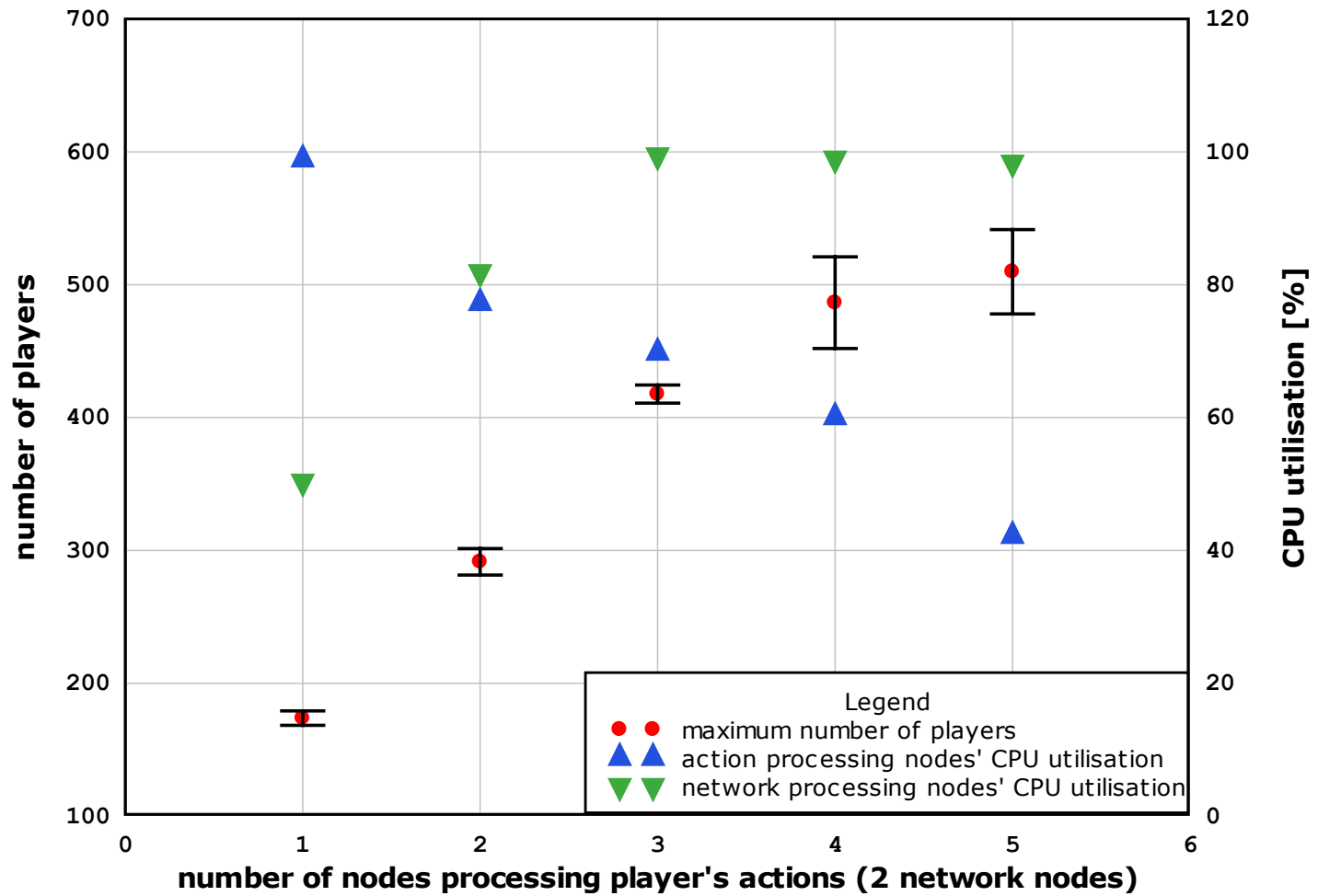
The server was overloaded in the 60th second of the test



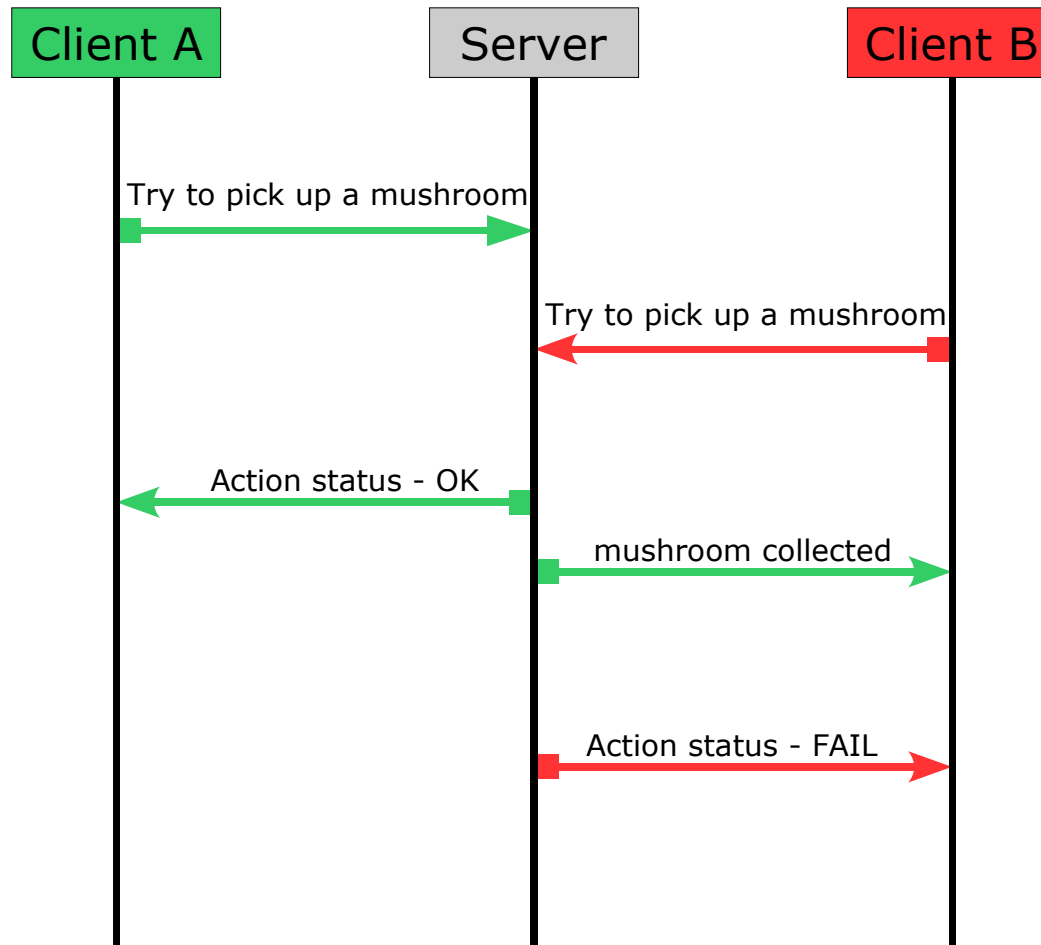
Architectures with double-function nodes



Architectures with single-function nodes

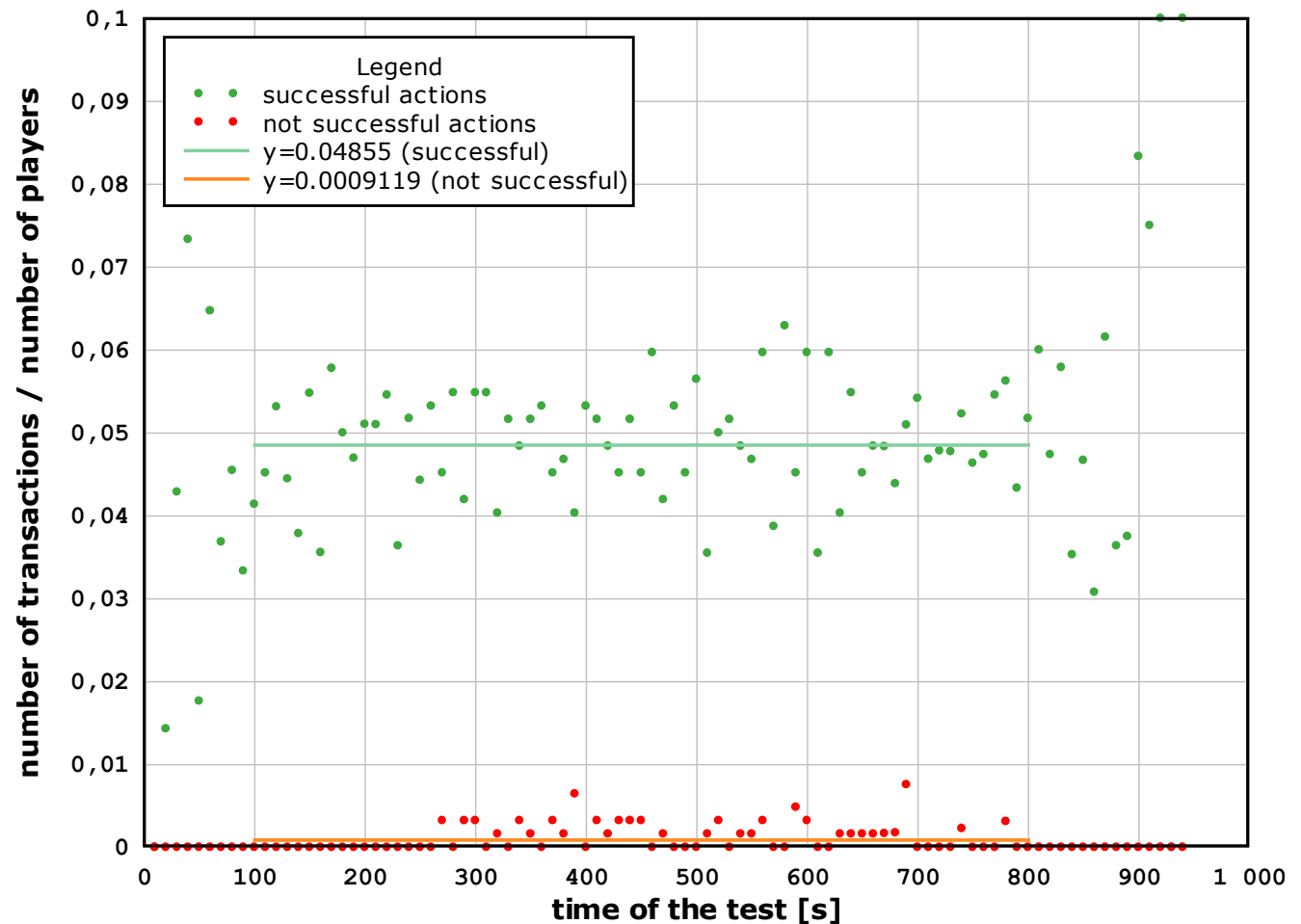


Synchronising issue



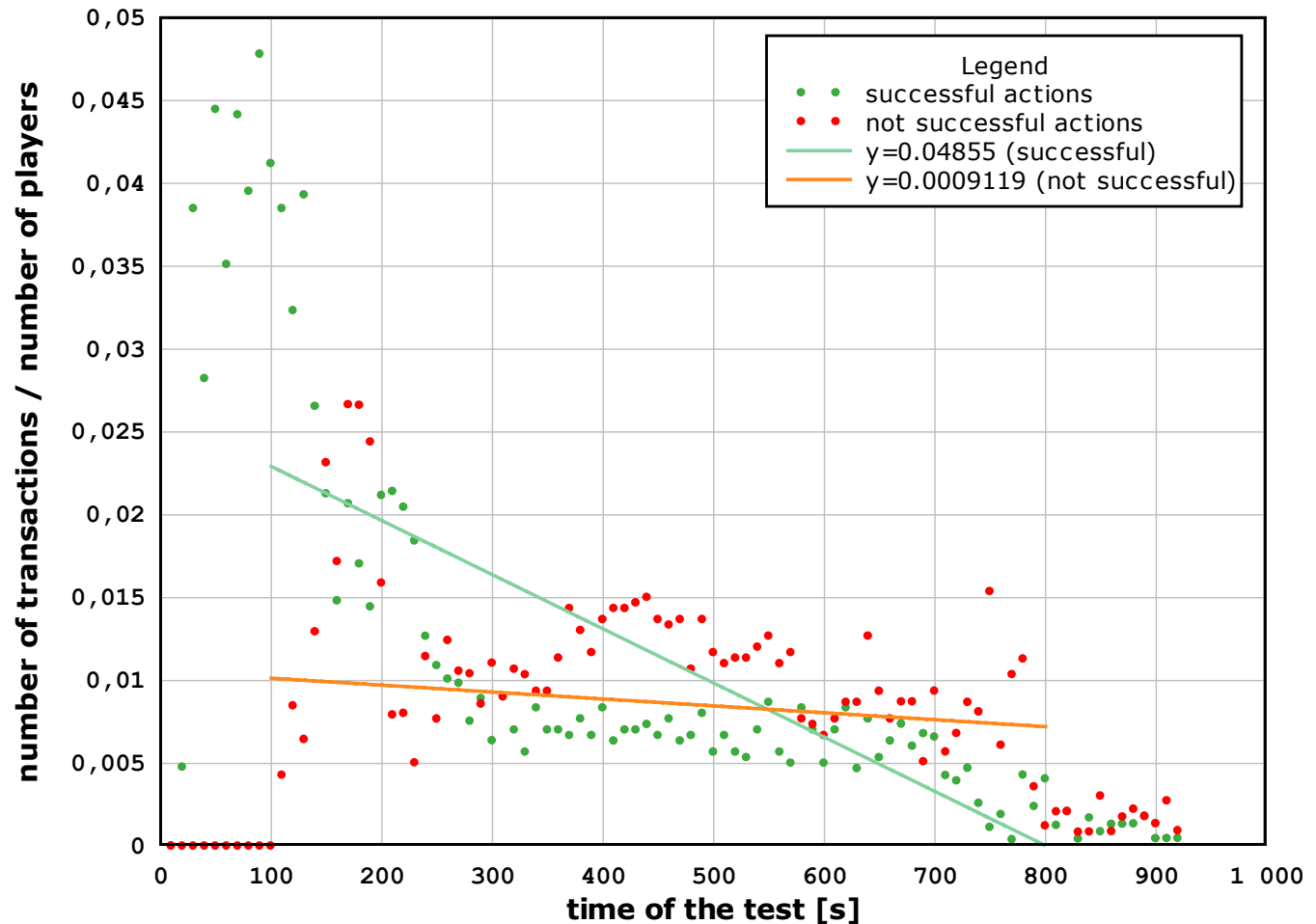
Desynchronisation of the game's state

- Server is not overloaded
- More successful actions



Desynchronisation of the game's state

- Server is overloaded
- More actions fail



Conclusions

- Erlang/OTP is appropriate for developing prototypes of the distributed MMOG systems
- Rapid development of the prototype allows examining different algorithms in a relatively short period of time
- Future work
 - *algorithms not dependent on the player's position*

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