JÜLICH
FORSCHUNGSZENTRUM

Computational Steering Revisited

2016-06-23 | Björn Hagemeier, Christian Böttcher, Bernd Schuller

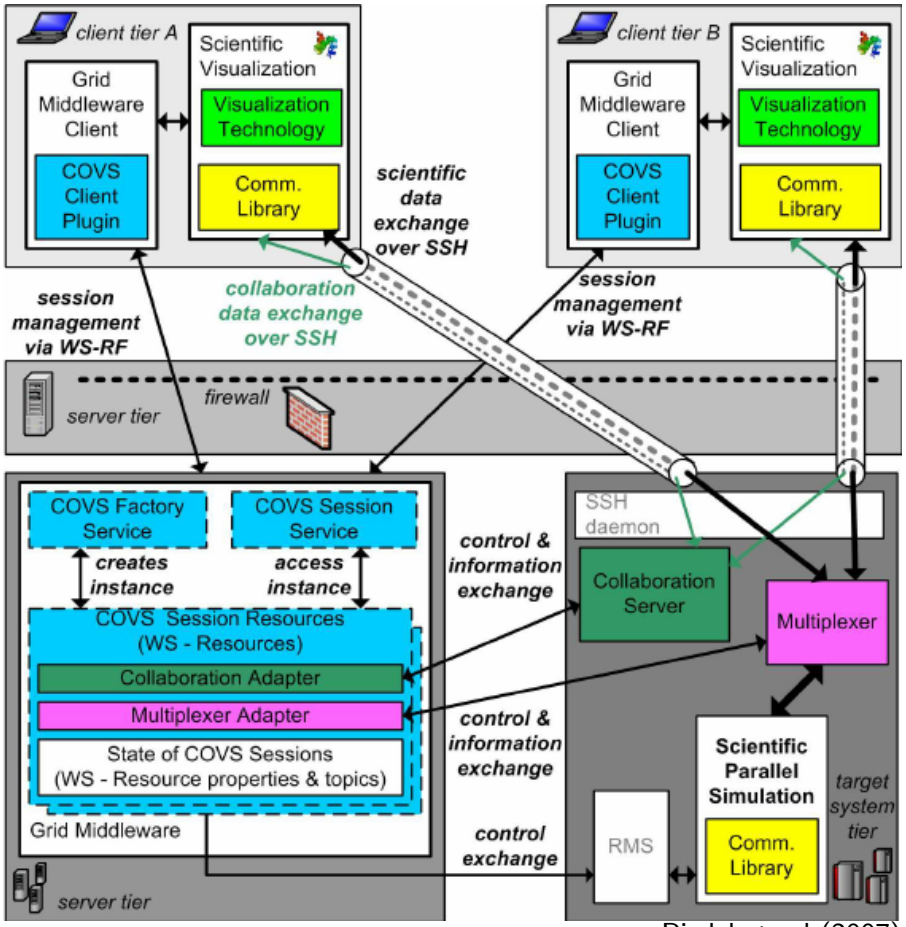
JÜLICH FORSCHUNGSZENTRUM

Outline

- Computational Steering
  - COVS, UGSF
- Current Goal
  - HBP SP5 (Neurorobotics)
- Implementation
  - Bad approach
  - Good approach
- Results
- Open Issues
- Summary

History

Collborative Visualization and Steering – COVS

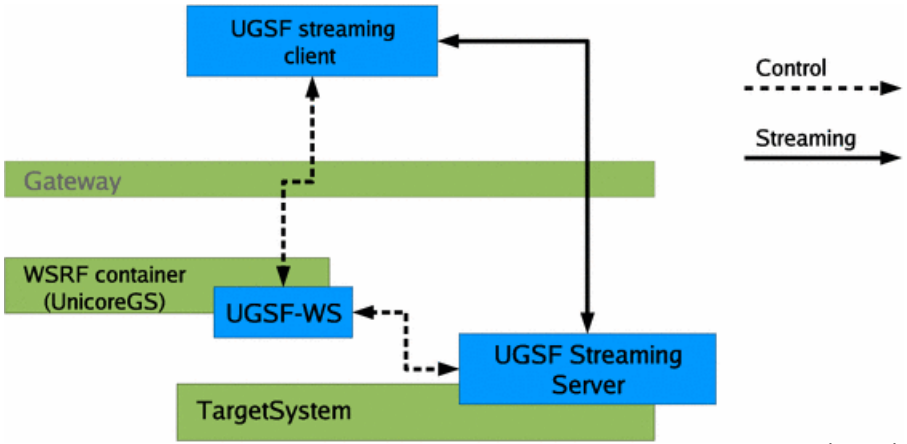


Riedel et. al (2007)

- SSH tunnels
- Collaboration
- Application instrumentation

History

UniGrids Streaming Framework – UGSF



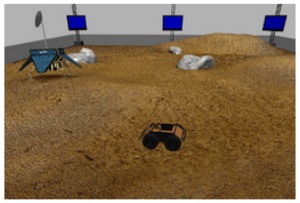
Benedyczak et. al (2007)

- Protocol-specific plugins
- and connection tunneling

Current Goals

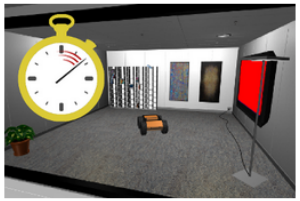
Neurorobotics

Workspace | **Example experiments**



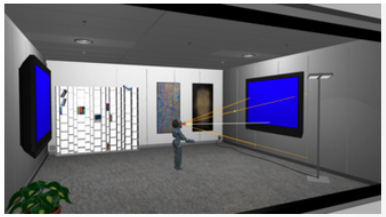
Husky Braitenberg experiment in the SpaceBotCup 2013 arena

This experiment loads the Husky robot from Clearpath Robotics and the arena from the SpaceBotCup 2013. If the user starts the experiment, the Braitenberg vehicle network is executed and the robot will...



Husky Braitenberg experiment with automatically switching screens

This experiment is similar to the Husky Braitenberg one (Husky robot detecting red colour and driving towards it). In this experiment the right screen is turned red automatically after...



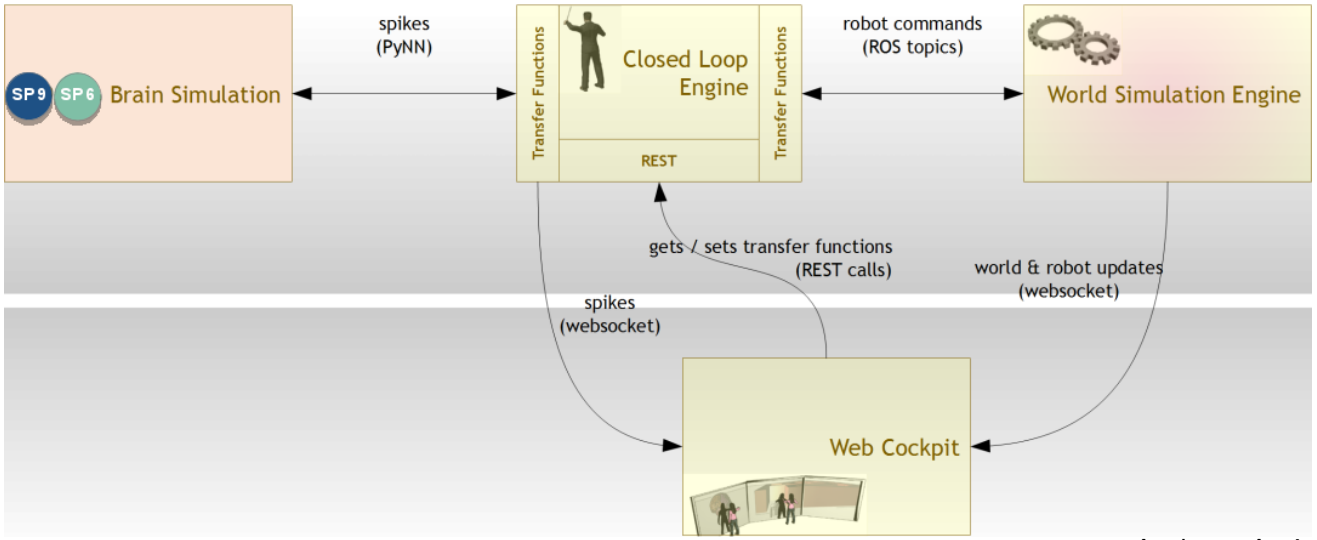
iCub Visual Tracking experiment

In this experiment the iCub robot performs a Visual Tracking task in the virtual room environment.
Timeout: 00 00:14:00
Backend availability: 13 / 14
Cluster availability: 6 / 34

✚ Launch | Upload custom environment

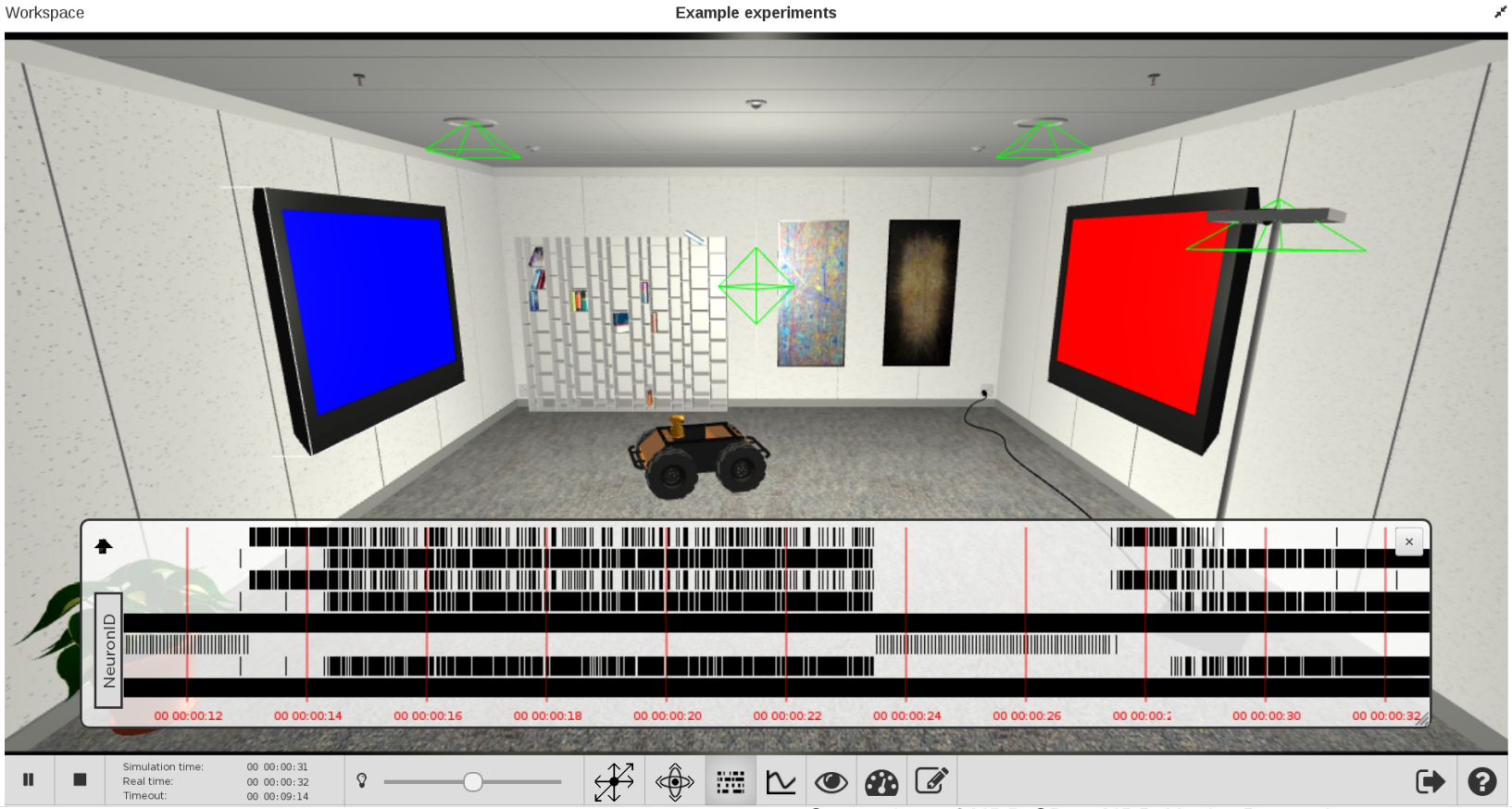
Screenshot of HBP SP10 NRP Example Experiments

NRP Architecture



Axel von Arnim, HBP SP10

NRP Web Cockpit



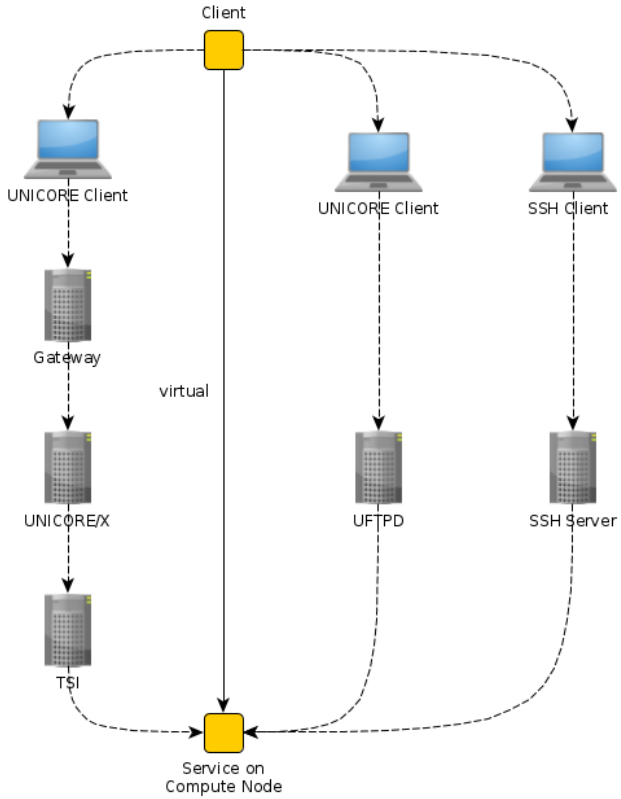
Screenshot of HBP SP10 NRP Husky Braitenberg Experiment

Requirements

- Network tunnel into HPC resources
- Forwarding VNC connections
- Low latency
- Bandwidth?

Architecture
Options

- Many hops
- Higher latency expected
- Implementation difficult

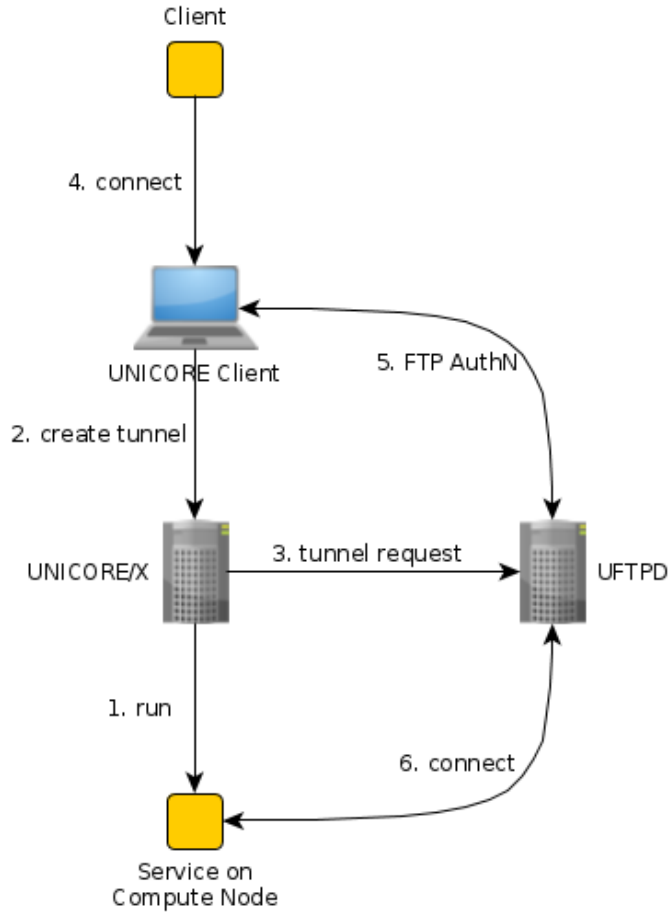


Own

- Fewer hops
- Proven components
- Easier implementation

Implementation
Tunnel Setup

- Same flow as for *ordinary* UFTP connections
- Firewall friendly



Own

Tunnel Setup
UCC

- New `create-tunnel` command
- Parameter `-L` resembling SSH syntax
- Source Address can be set via `-i`
  - Important for NATing or multiple interfaces
- Example:

```
$ ucc run iperf.u -a
720208ac-7015-49c3-b0c1-9e047b4287be.job
$ ucc create-tunnel 720208ac-*.job -L 5001:localhost:5001
Listening on localhost:5001
```

Results

Some (superficial) measurements

Throughput/Bandwidth

- Measured using iperf (submitted as job)
- No noticable difference to native performance or SSH tunnels

Latency

- Usable for VNC, no noticable lag

Results

IPerf

- 6 consecutive tests, 2 each using UFTP, SSH, and direct connections
- Server side log

```
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  5] local 127.0.0.1 port 5001 connected with 127.0.0.1 port 41246
[ ID] Interval       Transfer     Bandwidth
[  5]  0.0-10.8 sec   120 MBytes  93.5 Mbits/sec
[  7] local 127.0.0.1 port 5001 connected with 127.0.0.1 port 41252
[  7]  0.0-10.7 sec   119 MBytes  93.4 Mbits/sec
[  5] local 127.0.0.1 port 5001 connected with 127.0.0.1 port 41253
[  5]  0.0-11.0 sec   119 MBytes  91.3 Mbits/sec
[  7] local 127.0.0.1 port 5001 connected with 127.0.0.1 port 41254
[  7]  0.0-11.0 sec   123 MBytes  93.5 Mbits/sec
[  5] local 192.168.16.142 port 5001 connected with 134.94.168.32 port 52196
[  5]  0.0-10.1 sec   112 MBytes  93.6 Mbits/sec
[  7] local 192.168.16.142 port 5001 connected with 134.94.168.32 port 52200
[  7]  0.0-10.1 sec   112 MBytes  93.6 Mbits/sec
```

Open Issues

The small print

- Need to deploy full NRP scenario including VirtualGL over VNC
- Currently only a single connection possible after tunnel setup
- Tunnel tear-down needs to be implemented
- It is not as straighforward to implement SSH tunnels as it may seem
- More measurements under various conditions
  - Better abstraction is needed

Summary

- Extended UFTPD to support network tunneling
- Promising results, comparable to other solutions
- A number of open issues to solve