Enabling Global Growth with NVIDIA GRID
Enabling global growth with NVIDIA GRID

Rody Kossen & Jits Langedijk
About Rody

- Senior System Engineer @ AWL
- Build: 1987 (30 years)
- Degrees: BSc in Mechanical Engineering
- Married with Linda
- Proud father of Tim (11 months)
- Hobbies: Bicycling, Gaming, Dad

- Twitter: @R_Kossen
- Email: r.kossen@awl.nl

- Started at MechDes in 2009 as Mechanical Engineer
- Switched to IT in 2010
- Started January 1st 2015 at AWL as ICT Professional
- Technical Lead since July 2016
About Jits

- Jits Langedijk
- Technology Officer
- PQR

- Email: Jits.Langedijk@PQR.nl
- Twitter: @JRLangedijk
- LinkedIn: jitslangedijk

- Workspace IoT
- TeamRGE
- Citrix Technology Advocate
What to expect

- A look into a high tech company
- The challenges of being global
- Our approach
- The technology
- User experience
- Lessons Learned
- The future
About us

- More than 50 years of experience in
  - automation
  - robotization
  - joining technology
- Global partner
- Privately owned
- Midsize
- Expert in laser welding
- Passionate professionals
- High tech welding machines
History

1993: Founding of AWL-Techniek BV
New start-up with 48 employees | Spin-off from Aarding WeerstandsLas BV. (1965)

1994: First automated arc-welding equipment for automotive industry
1997: 60% Arc welding

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New headquarters in Harderwijk

Introduction of modular construction
Explosive growth of robotized welding
Strong focus on R&D
2nd hall AWL CZ
New facility AWL CN

2003: Start with laser welding

Start AWL CZ

Development of new laser welding fixtures

From product-oriented to market-oriented
“Keeps you ahead in Automated Welding”

Development of the AWL Laser Beam Switch Concept
2012: Explosive growth laser welding projects (60%)

AWL 20 years

Globalization, Start-up AWL CN, New facility CZ

Start-up AWL MX
Keeps you ahead in automated welding | www.awl.nl

Our staff

- **500+**

Happy employees
- **78%**
- **22%**
- **0%**

Sickness
- **1.4%**

Educational level
- Medium
- Bachelor education
- Master education or higher

Average age
- **39.4**

Average service years
- **8.2**
Our markets

Automotive Seating
Global customers who require mainly high volumes and variety, in many cases cell concepts.

Automotive Body
Global customers with large and complex products. Many different parts have to come together.

Special Projects
Cabinets, sprinklers, heating, tubing, doorframes, storage, etc.
MechDes Engineering

- **Mechanical Design**
- Since 1994
- >55 mechanical design engineers
- Under one roof with AWL

**Tooling Automotive**

**Special machines**

**Special Equipment | Offshore**
A global partner for our customers

AWL MX
Querétaro
Office and workshop

AWL US
Spartanburg
Office and workshop

AWL NL
Harderwijk
Headquarters

AWL CZ
Napajedla
Office and workshop

AWL CN
Wuxi
Office and workshop
AWL & PQR -> 2014

Support on:

- Citrix environment
- Watchguard
- vSphere
- RES One Workspace
- AD DS
- Network and Storage
- NVIDIA GRID
The Challenge

- **Supporting quick growth of AWL**
  - 2013 – 2 Locations (NL – CZ)

- **Decentralized IT**
  - Spread of data (large file transfers)
  - No Single Source of Truth
  - No collaboration

- **Costs and Time**
  - Maintenance
  - Installation of software
WE CANNOT SOLVE OUR PROBLEMS WITH THE SAME THINKING WE USED WHEN WE CREATED THEM

- Albert Einstein
Proof of Concept at MechDes

- Started at release of NVIDIA GRID in 2013
- 8 Mechanical Engineers on 1 server
- XenDesktop 7.1 / XenServer 6.2 SP1 ( BETA )
- NVIDIA GRID Release 0.9 ( Preview )

Before NVIDIA GRID

- Only 1:1 passthrough
- User density per server to low
The Approach

- Used BETA for production
  - PoC successful
  - Users liked the flexibility

- As a CAD user I fixed my own issues
  - Fast
  - Flexible
  - Always access to my data
Production

- Production environment in 2014-2015
- 150 CCU NVIDIA GRID users
- 12 servers with K2 and M60
- 2 vGPU profiles
Profiles

- **Engineer**
  - High performance
  - High vGPU Profile
  - SolidWorks etc.
  - 8 users (GRID K2) or 16 users (M60) per server

- **Viewer (Mechanic)**
  - Medium performance
  - Medium vGPU profile
  - eDrawings Viewer
  - 16 users (GRID K2) per server

- **Office (XenApp)**
  - Normal performance
  - High vGPU Profile (shared with 20 users)
  - Microsoft Office / Navision etc.
  - 20 users per VM
User Experience

- Functionality before Technical Solutions
- Perceived performance before admin performance
  User eXperience is KEY

- Measure UX
### User Experience

- **Functionality before Technical Solutions**
- **Perceived performance before admin performance**
- **User eXperience is KEY**
- **Most usable if combined with technical (objective) data**

- **Latency / Bandwidth / NetFlow or sFlow**

<table>
<thead>
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<th>1</th>
<th>3</th>
<th>6</th>
<th>9</th>
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<tbody>
<tr>
<td>Very blurry</td>
<td>Very blurry</td>
<td>Blurry</td>
<td>Good</td>
<td>Clear</td>
<td>Crystal clear</td>
</tr>
<tr>
<td>Very Hard</td>
<td>Very Hard</td>
<td>Hard</td>
<td>Neither</td>
<td>Quite easy</td>
<td>Very Easy</td>
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<tr>
<td>Unimportant</td>
<td>Unimportant</td>
<td>Little unimportant</td>
<td>Neither</td>
<td>Little important</td>
<td>Important</td>
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<tr>
<td>Extremely Bad</td>
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<td>Quite Bad</td>
<td>Good</td>
<td>Quite Good</td>
<td>Extremely Good</td>
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<tr>
<td>Very Slow</td>
<td>Very Slow</td>
<td>Slow</td>
<td>Intermediate</td>
<td>Quick</td>
<td>Extremely Quick</td>
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<tr>
<td>Very Weak</td>
<td>Very Weak</td>
<td>Weak</td>
<td>Intermediate</td>
<td>Strong</td>
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</tr>
</tbody>
</table>

Keeps you ahead in automated welding | www.awl.nl
## Subjective Results

### RESULTS TESTING CITRIX AWL CN WUXI WEEK 7

<table>
<thead>
<tr>
<th>RECEIVER / CITRIX VERSION</th>
<th>DATE</th>
<th>TIME TEST</th>
<th>INITIALS</th>
<th>4.6 / 7.12</th>
<th>4.4 / 7.8</th>
<th>4.3 / 7.8</th>
<th>4.6 / 7.12</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>HYI</td>
<td>15-2</td>
<td>10:30</td>
<td>16-2</td>
<td>11:05</td>
</tr>
<tr>
<td></td>
<td>4.6</td>
<td>7.12</td>
<td>WEWU</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>7.8</td>
<td>JLOE</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4.3</td>
<td>7.8</td>
<td>JLOE</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

1. Browse through SmarTeam Projects or documents, what is the screen quality?
2. Rotate your model in SolidWorks, how fast is the rotation?
3. Open the PLM Viewer and browse a project, is the text readable?
4. In SolidWorks open the File menu, how fast is it?
5. How important is clear text (no blurriness) to you?
6. How important is a clear rotating model to you?
Objective Results (sFlow)

<table>
<thead>
<tr>
<th>DATA FLOW</th>
<th>% TRAFFIC</th>
<th></th>
<th># MBIT</th>
<th></th>
<th>LATENCY ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SMB</td>
<td>CITRIX</td>
<td>OTHER</td>
<td>CITRIX</td>
<td>OTHER</td>
</tr>
<tr>
<td>10:30 - 10:45 / 03:30 - 03:45</td>
<td>55%</td>
<td>25%</td>
<td>20%</td>
<td>1.85</td>
<td>5.60</td>
</tr>
<tr>
<td>12:00 - 12:15 / 05:00 - 05:15</td>
<td>72%</td>
<td>5%</td>
<td>23%</td>
<td>0.24</td>
<td>5.00</td>
</tr>
<tr>
<td>12:15 - 12:30 / 05:15 - 05:30</td>
<td>40%</td>
<td>22%</td>
<td>38%</td>
<td>1.28</td>
<td>3.94</td>
</tr>
<tr>
<td>14:00 - 14:15 / 07:00 - 07:15</td>
<td>38%</td>
<td>24%</td>
<td>38%</td>
<td>1.39</td>
<td>4.60</td>
</tr>
<tr>
<td>16:00 - 16:15 / 09:00 - 09:15</td>
<td>33%</td>
<td>11%</td>
<td>56%</td>
<td>1.37</td>
<td>2.56</td>
</tr>
</tbody>
</table>
Lessons learned

- User Experience is KEY!
- Expectations and clear instructions
- Max latency ~250ms
- New Citrix releases (7.12+) give better results:
  - Selective H264
  - EDT (UDP based protocol)
- RPi3 / Intel NUC are great ThinClients (ThinLinx)
- WAN Emulator

Linktropy Mini²
Basic WAN emulator for links up to 100 Mbps in a portable, low-cost device
Lessons learned

**3D Graphics**

- 99.9% of applications work as intended
- Only use XenDesktop
- Minimal of 4 vCPU
- Check GPU needs with GPUSizer
  [https://gpusizer.com](https://gpusizer.com)
- HDX3DPro + NVEnc -> Lower CPU usage
- RemoteDisplayAnalyzer
  [https://www.rdanalyzer.com/](https://www.rdanalyzer.com/)
Lessons Learned: Sizing

**Engineer**
- 4 vCPU
- 16 GB Ram + 8 GB PVS RAM Cache
- vGPU: M60-2Q
- Windows 7 x64
- 16 users per server

**Viewer**
- 4 vCPU
- 8 GB Ram + 8 GB PVS RAM Cache
- vGPU: K240Q / M60-1Q
- Windows 7 x64
- 16 users (K2) or 32 users (M60) per server

**Office (XenApp)**
- 6 vGPU
- 16 GB Ram + 8 GB PVS RAM Cache
- vGPU: K260Q
- Server 2012R2
- 20 users per VM
Lessons Learned: Hardware

- **Dell R720**
  - 2x E5-2680 v2 (10 cores)
  - 256 GB Memory
  - 2x NVIDIA Grid K2
  - XenServer 7.1

- **Dell R730**
  - 2x E5-2690 v4 (14 cores)
  - 512 GB Memory
  - 2x NVIDIA Tesla M60
  - XenServer 7.1

- Always buy => 512GB Ram!
Lessons Learned: LAB Environment

Dell R720

- 2x E5-2690 v2 (10 cores)
- 128 GB Memory
- 1x NVIDIA Tesla M60
- XenServer 7.2

Citrix

- XenDesktop 7.14
- StoreFront 3.11
- PVS 7.14 with PVS Cache
Lessons Learned: LAB Environment
Lessons Learned: LAB Environment

<table>
<thead>
<tr>
<th>Details</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available: 2/3</td>
<td>Under Maintenance</td>
</tr>
<tr>
<td>AWL ENG XD711 - Test</td>
<td>Engineer R26 TEST</td>
</tr>
</tbody>
</table>

- Details: Session Connected
  - AWL ENG XD711 - Test

- Details: Session Disconnected
  - AWL ENG XD711 - Test
The Future

- **NetScaler SD-WAN**
  - Quality of Service
  - Virtual WAN – Use of all connections
  - Printing

- **Expanding our AWL “Cloud”**
  - NVIDIA Pascal
  - AWL MX / AWL US

- **Geo DNS**
  - Fastest route through OUR connections
  - NetScaler Global Server LoadBalancing
Steve Jobs
1955-2011

“The ones who are crazy enough to think that they can change the world, are the ones who do.”
Ultimate Future

- Usage of Deep Learning and Machine Learning
  - Predictive Sizing
  - Dynamic Scaling

- New Business Models
  - Predictive Maintenance
  - COBOTS
  - ...
Thank you for your attention.
Any questions?