Empulse GmbH
Michael Hummel - Managing Director
ParStream - a parallel database on GPUs

GTC, San Jose Convention Center, CA  |  Sept. 20-23, 2010
Huge demand for mass-data analysis

The demand for analysis of structured mass data is growing tremendously in all industries.

<table>
<thead>
<tr>
<th>eCommerce</th>
<th>Social Networks</th>
<th>Finance</th>
<th>Telco</th>
<th>Energy</th>
<th>Many more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web analytics</td>
<td>Ad serving</td>
<td>Algo trading</td>
<td>Profiling</td>
<td>Smart metering</td>
<td>Science</td>
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<tr>
<td>SEO</td>
<td>Profiling</td>
<td>Trend analysis</td>
<td>Targeting</td>
<td>Smart grids</td>
<td>Transportation</td>
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<td>Affiliate nets</td>
<td>Targeting</td>
<td>Fraud detection</td>
<td>Billing</td>
<td>Wind parks</td>
<td>Security</td>
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Billions of records need to be analysed quickly - an $8 billion market
Current databases are not engineered for mass-data

“Existing databases are outdated”
Several Statements on VLDB2010

Many new approaches moving in the wrong direction

“MapReduce ... we got rid of it.”
Lipkovitz, Senior Director of Engineering, Google - 09/09/10
ParStream - a revolutionary parallel database for high-performance mass-data analysis

- Unique index technology
- Efficient parallel processing
- Ultra-fast, even with billions of records
- Scales linearly up to petabytes
- Real-time analysis, continuous import
- Cost & energy efficient
ParStream’s unique index enables parallel processing

Conventional database

- Only predefined analysis
- Sequentially

![Diagram of conventional database with decompression](image)

ParStream’s approach

- Immediate massiv-parallel analysis
- Flexible analysis
- No decompression required
- Fits into GPU memory

![Diagram of ParStream's approach with small size](image)
Experts are impressed

- An extremely innovative idea
- Convinced me completely
- 2 years ahead of competition

Prof. Dr. Markl, leading database expert at the TU Berlin

Customers are delighted

- Outperforms all databases by a factor of at least 35
- Reduced our response time from 3 minutes to 15 ms (x12000)
- Scales linearly
- Runs stable in production

Leading web-analytics company
Today: Market-ready

- Successful running in productive customer environments
- Complete, market-ready product
- empulse is privately held, no capital raised
- Supported by German Ministry of Economics
- Research partner TU Berlin

In 5 years: $200 Mio TO

- International company with industry specific solutions
- BI market $8 billion p.a.
- Expected market share >2%
- Turnover $200 Mio p.a. with licenses, services & consulting
Thank you for your attention!

A revolutionary parallel database for online-analysis of structured mass-data

www.parstream.com
Backup
### Customer projects - some examples:

<table>
<thead>
<tr>
<th>Service</th>
<th>Feature</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web analytics provider</td>
<td>Concurrent User Calculation</td>
<td>1 billion records in 15 ms</td>
</tr>
<tr>
<td>SEO Consultant</td>
<td>Data mining</td>
<td>1 billion records joined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>together within &lt; 1 second</td>
</tr>
<tr>
<td>Market research</td>
<td>Flexible multi-column filtering &amp; grouping</td>
<td>5000 queries, &gt;1000 columns per online-analysis</td>
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<tr>
<td>Climate research</td>
<td>Filter &amp; geo-clustering</td>
<td>3 billion records in 100 ms</td>
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<tr>
<td></td>
<td></td>
<td>to scale up to 3 petabyte</td>
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<tr>
<td>Best travel offer search</td>
<td>High throughput for complex filter &amp; sort</td>
<td>1000 queries per second</td>
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<tr>
<td></td>
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<td>on 1 billion travel offers</td>
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</table>
## Our main challenge is fast growth

| Establish strong sales & consulting | - Partner with vendors, integrators & solution providers  
|                                  | - Recruit experienced market specialists |
| Go international                | - Invest in market entry & structures in Europe & US |
| Stay in the lead                 | - Speed up growth through financing  
|                                  | - Develop industry specific solutions |
| Grow organisation               | - Hire IT, sales and market experts |
| Complexity                      | - Sell, plug & play appliance / establish database services |
Current databases are not engineered for mass-data

“Existing Database Architectures are 20-30 years old and are not able to cope with current data sizes.”

Several Statements on VLDB2010

Many new approaches moving in the wrong direction

“MapReduce isn’t suited to calculations that need to occur in near real-time. You can’t do anything that takes a relatively short amount of time, so we got rid of it.”

Lipkovitz, Senior Director of Engineering, Google - 09/09/10
Academics are impressed…

- “ParStream is an extremely innovative idea for processing data in parallel.”
- “The fundamental concept of ParStream, as well as its innovative aspects, have convinced me completely.”
- “Based on the advancement of empulse ... it is unlikely that competitors will be able to develop a comparable product within the next two years.”
Customers are delighted...

- “On average, ParStream outperforms competing commercial, column-oriented databases by a factor of 35”

- “ParStream scales linearly: The response times grow as expected for large data volumes. No decrease in performance could be observed.”

- “Over the last few months, ParStream has been running stable in production with multiple instances running on different servers.”
Benefits at a glance:

ULTRA-FAST: get analytical results in fractions of a second
SCALABLE: easily store & analyse billions of records
UNIQUE: perform analytics that were previously not feasible
REALTIME: simultaneously import and analyse data
EFFICIENT: get more effective use of your business framework
COST-EFFECTIVE: save on infrastructure costs
ParStream - a complete parallel database on GPUs