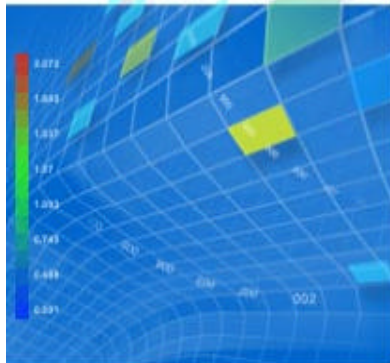**Second Grid Engine Workshop**

Experiences at MSC.Software in Applying Sun Grid Engine in CAE Environments

23 September 2003

Stefan Afeldt, Stefan Mayer

Overview

- **Introduction**
- **Application of Grid Engine in CAE Environments**
  - **MSC.BatchSubmit**
  - **Webmin Module for Grid Engine**
  - **Compute Farm at MSC Munich**
  - **Customer Projects**
    - **Example: Simulation Data Management Infrastructure**

MSC SOFTWARE
SIMULATING REALITY

Introduction

- **MSC founded 1963 in California, since 1973 in Europe**
- **Known for decades as „Nastran company"**
- **Meanwhile extensive software portfolio for virtual product development (MSC.Nastran, MSC.Patran, MSC.Marc, MSC.Adams, MSC.Dytran etc.)**
- **Comprehensive service offering**
  - **Support**
  - **Trainings**
  - **Engineering services**
  - **Process design and automation**
  - **Simulation Data Management**

MSC SOFTWARE
SIMULATING REALITY

Introduction

- **Customer requests resulted in MSC also offering products and services for IT infrastructures**
  - **Initial focus on high performance computing and Linux (Linux clusters)**
  - **Extended by offerings around Unix, Windows, storage, high availability, etc.**
  - **Today MSC offers implementation and support of complete IT solutions including**
    - **Hardware**
    - **Operating system**
    - **Middleware**
    - **Application software**
    - **IT Services (integration, operation, training, etc.)**
    - **for virtual product development**

MSC SOFTWARE
SIMULATING REALITY

Introduction

- **Motivation for working with Grid Engine**
  - **Increased focus on effective resource utilization and job flow optimization in CAE environments**
  - **MSC.Software started with OpenPBS and LSF**
  - **Product features and quality together with attractive, flexible pricing models raised interest in Grid Engine**
  - **June 2003 Sun announced that MSC.Software will market, implement and support Grid Engine and offer associated services**

MSC SOFTWARE
SIMULATING REALITY

MSC.BatchSubmit

- **MSC.Software implements Grid Engine Solutions**
  - **By integration into customer specific environments (script or GUI based)**
  - **By setting up new script based environments**
  - **By MSC.BatchSubmit**
- **MSC.BatchSubmit is**
  - **Graphical interface between user and queueing system**
  - **Web based, easy to use, platform independent**
  - **Implemented using open source technology – Apache, MySQL, PHP**
  - **Grid Engine interface finalized**

MSC SOFTWARE
SIMULATING REALITY

MSC.BatchSubmit

- ## **Quick Overview of look and feel**

Webmin Module for Grid Engine

- **Webmin – web based system administration**
- **MSC.Software developed Webmin module for Grid Engine configuration**
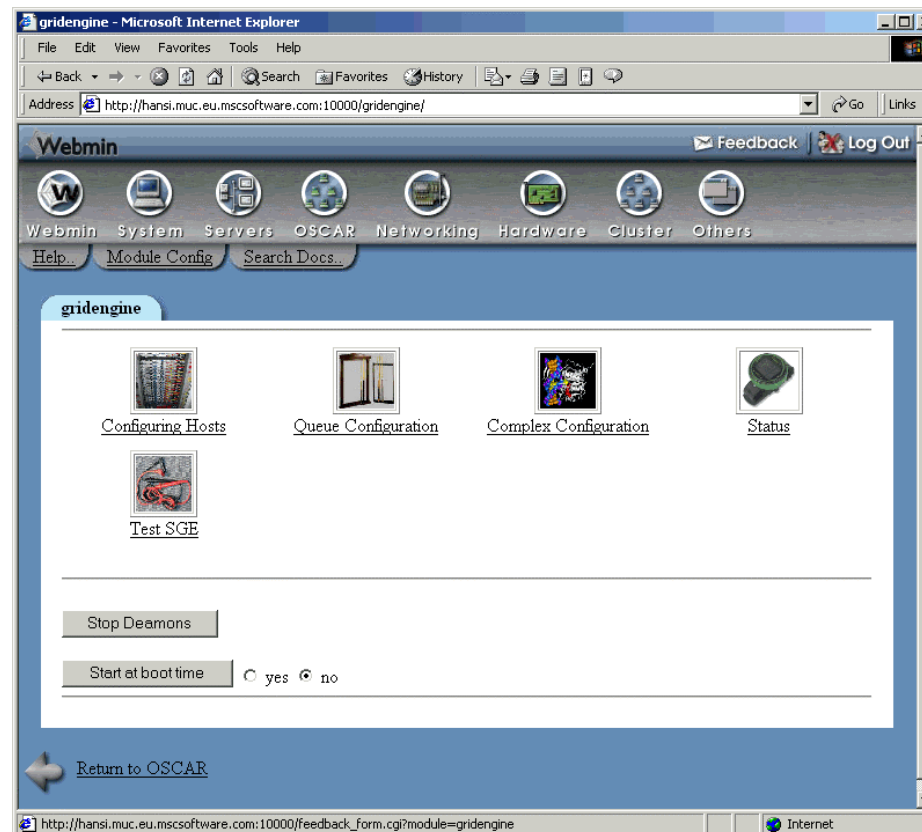
Compute Farm at MSC Munich

- **MSC.Software Munich hosts a heterogeneous compute farm with currently more than 100 CPUs**
  - **Managed by Grid Engine**
  - **Solaris, IA32 and IA64 Linux, HP-UX, IRIX, AIX**
  - **Acess for all MSC.Software engineers worldwide (approx. 700)**
  - **Includes a 64 node Linux cluster for stochastic analyses**

MSC SOFTWARE
SIMULATING REALITY

Stochastic Analyses

- **Importance of stochastic analysis**
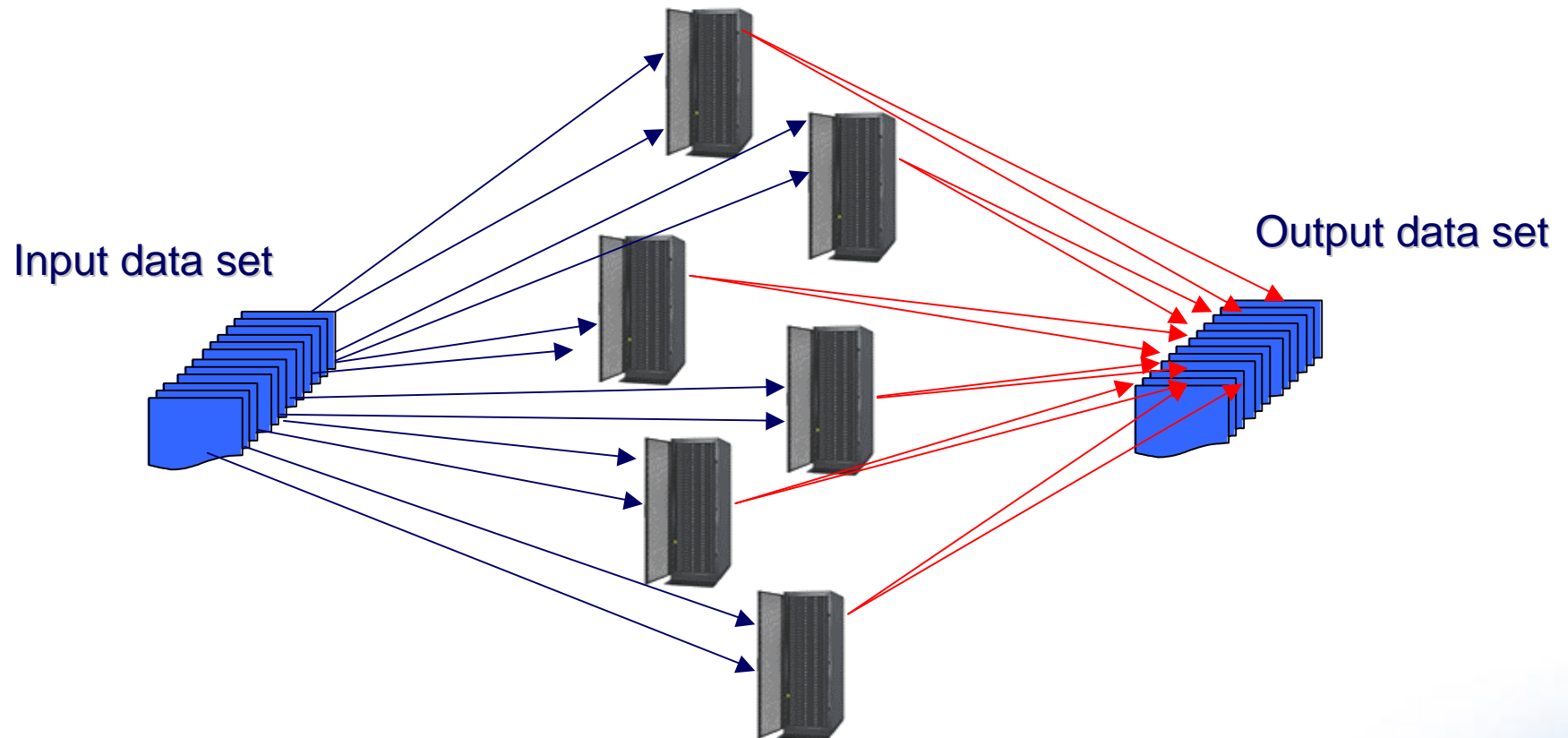   - **Natural scatter effects are not taken into account in deterministic calculations**

**Most likely behaviour**
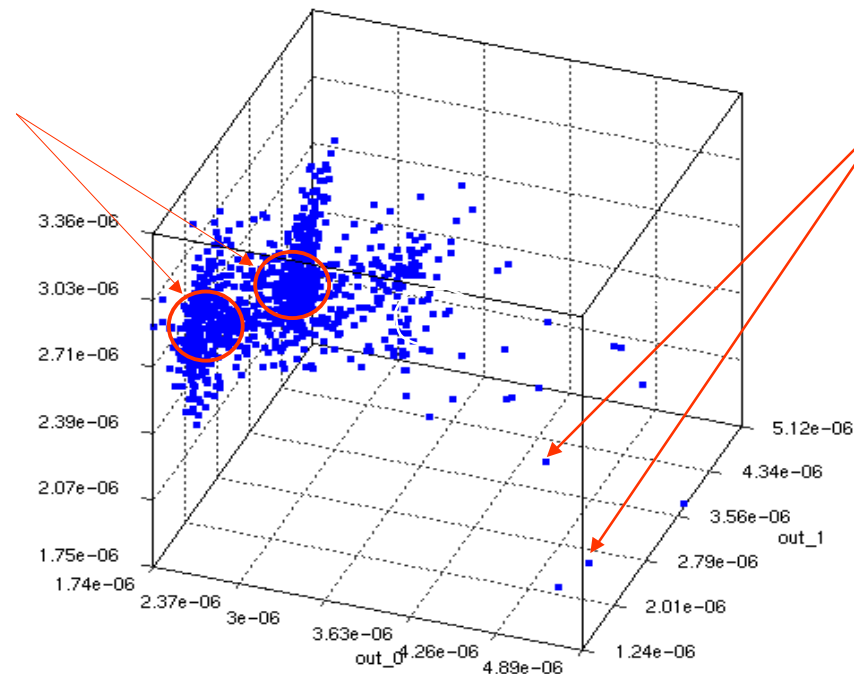
Exceptions can be dangerous

Stochastic Analyses

- **Concept of Monte Carlo simulations**


Input data set

Output data set

- **Clusters are ideal architecture, workload management is essential**

Customer Projects

- **MSC.Software implements IT infrastructure projects in complex environments**
- **Example: Simulation Data Management**
  - **Structured generation and administration of simulation data (Example: MSC.SDM)**
  - **All related subtasks managed by Grid Engine**
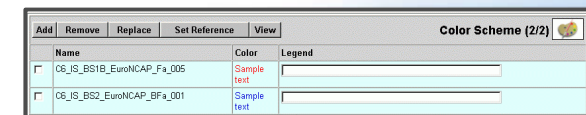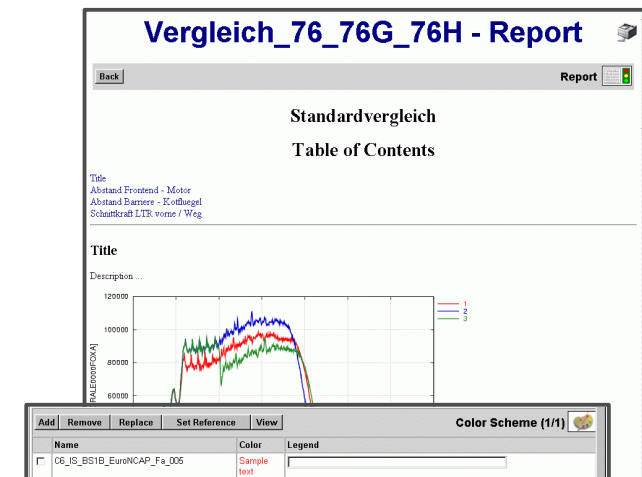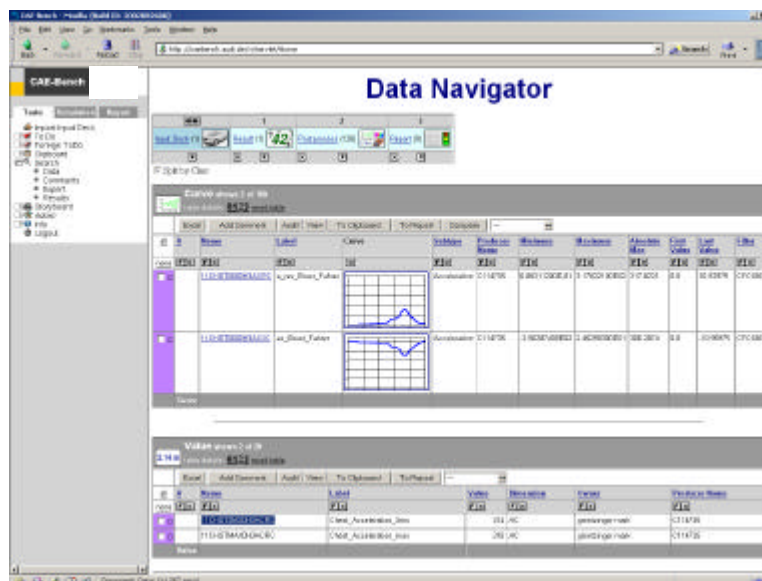
Simulation Data Management
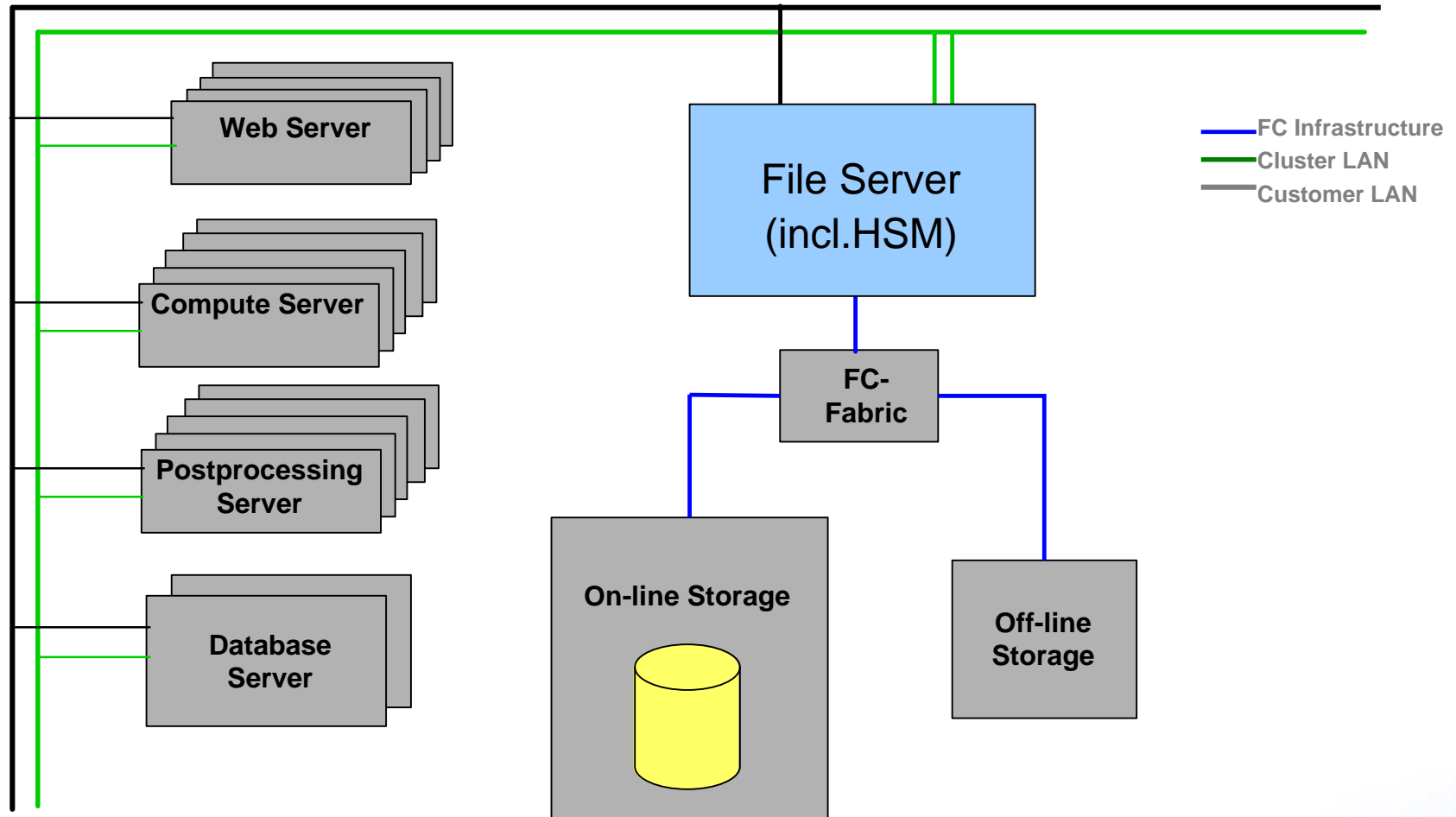
- **Example: Simulation Data Management Infrastructure at BMW Group**