

Highly Available Systems: Concepts and Practice One-Day Seminar

Seminar Description

This one-day seminar describes how highly available systems with annual downtimes measured in minutes or seconds can be implemented. The secret to high availability is fast failover to a redundant backup system.

An introduction to basic availability concepts leads to methods for implementing highly available systems. Fundamental to all highly available systems is data replication to a remote site. Various data replication techniques are studied, and commercially available data replication engines are described.

Highly available architectures that support a wide range of availability characteristics are presented. They include active/active systems that can provide uptimes measured in centuries by recovering from a fault in seconds.

Several case studies demonstrate successful implementations. Sprinkled throughout the seminar are many “never again” educational stories of disastrous failures of critical systems.

We will tailor the content of the seminar to meet your needs and interests.

Seminar Objectives

Attendees can expect to learn the following:

- Real examples of what can go wrong.
- Basic availability concepts
- The impact of redundancy on availability

- The use of data replication for database synchronization
- Data replication products
- How RPO and RTO is affected by the choice of data-replication technique
- Highly available architectures
- Active/active systems
- Eliminating planned downtime
- Real-life examples of highly available systems in practice

Prerequisites

Familiarity with transaction-processing systems and knowledge of simple algebra is recommended.

Instructor Biography

Dr. Bill Highleyman brings more than 40 years' experience in the design and implementation of mission-critical computer systems to his position as Chairman of The Sombers Group. Dr. Highleyman, a graduate of Rensselaer Polytechnic Institute and MIT, earned his doctorate degree in electrical engineering from Polytechnic University. He has published extensively on availability, performance, testing, and middleware issues. He is the author of “Performance Analysis of Transaction Processing Systems,” published by Prentice-Hall, and is coauthor of the three-volume series, “Breaking the Availability Barrier.” Dr. Highleyman holds several patents and publishes the free monthly Availability Digest available at www.availabilitydigest.com.

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9:00 – 10:30: Concepts in Availability

MTR, MTBF, Availability, and their relationship
The 9s game – Measuring availability as 9s
The impact of redundancy on availability
Failure modes – what are they and what is their affect on availability
Calculating availability
Node failures
Effects of failover times and faults

10:30 – 10:45: Break

10:45 – 12:15: Data Replication

Synchronizing database copies with data replication
Asynchronous replication:
Replication latency
Data loss following a node failure
Data-collision detection and resolution
Synchronous replication:
Application latency
Network deadlocks
Recovery Time Objective (RTO) and Recovery Point Objective (RPO)
The importance of redundant, reliable networks
Other uses for data replication:
Disaster recovery
Application integration
Replication does not eliminate backups
Replication products:
GoldenGate
Shadowbase
DRNet

12:15 – 1:15: Lunch

1:15 – 2:45: Highly Available Architectures

Fault-tolerant systems (single node)
HP NonStop
Stratus
Active/standby systems:
Magnetic tape
Virtual tape
Active/passive systems:
Unidirectional replication
Unidirectional async replication
Active/active systems:
Bidirectional synchronous replication
Bidirectional async replication
Eliminating planned downtime
Fast failover
Other advantages of active/active
Elimination of failover decision time
Disaster tolerance for free
Efficient use of all capacity
Risk-free failover testing
Application scaling
Load balancing
Lights-out operation

2:45 – 3:00: Break

3:00 – 4:30: Highly Available Systems in Action

Financial case studies
Telecommunication case studies
Other case studies
The impact of virtualization
Cloud computing
More “Never Again” disaster stories