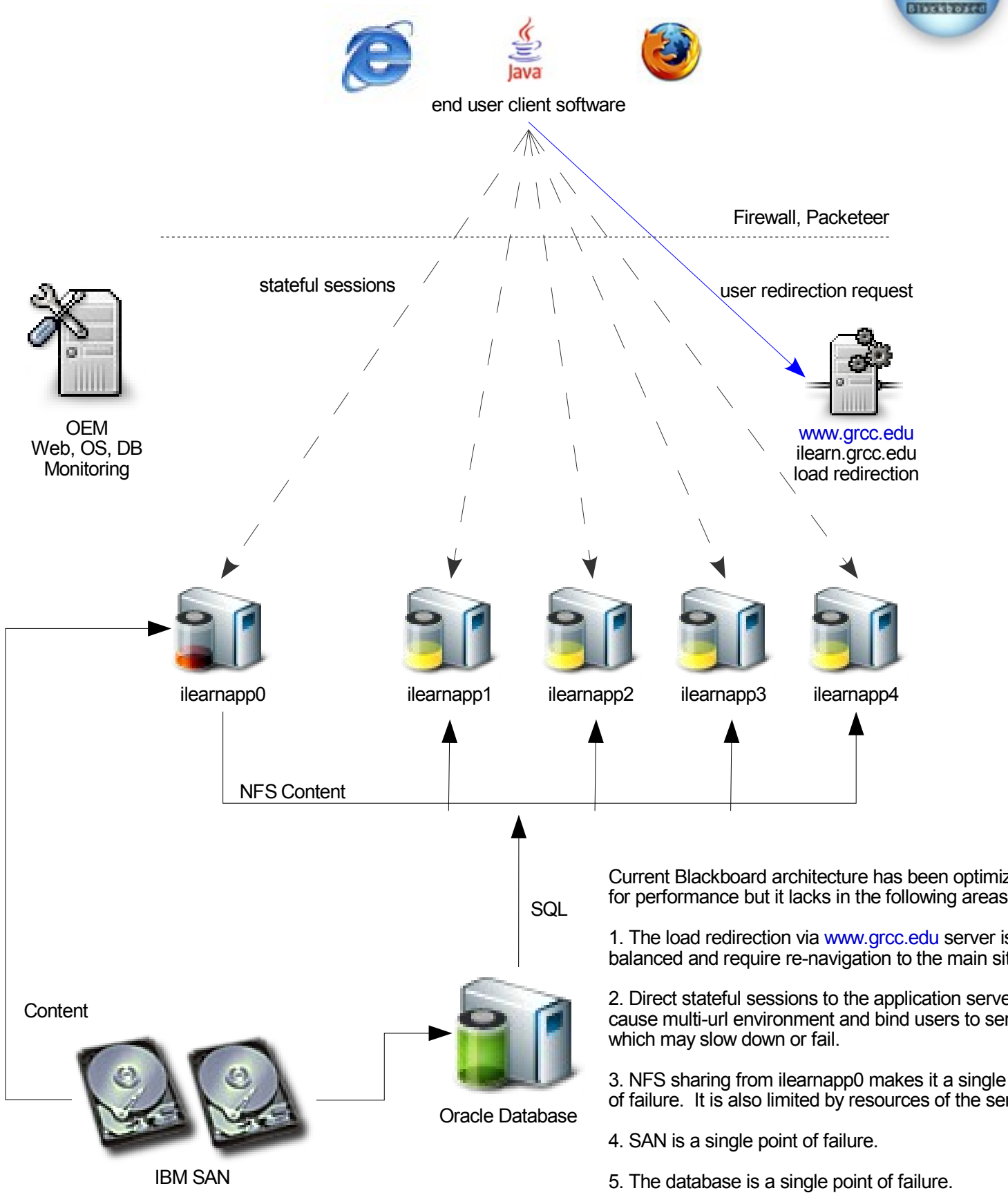
1/17/2008

Current GRCC BB LS Architecture



Current Blackboard architecture has been optimized for performance but it lacks in the following areas:

1. The load redirection via www.grcc.edu server is not balanced and require re-navigation to the main site

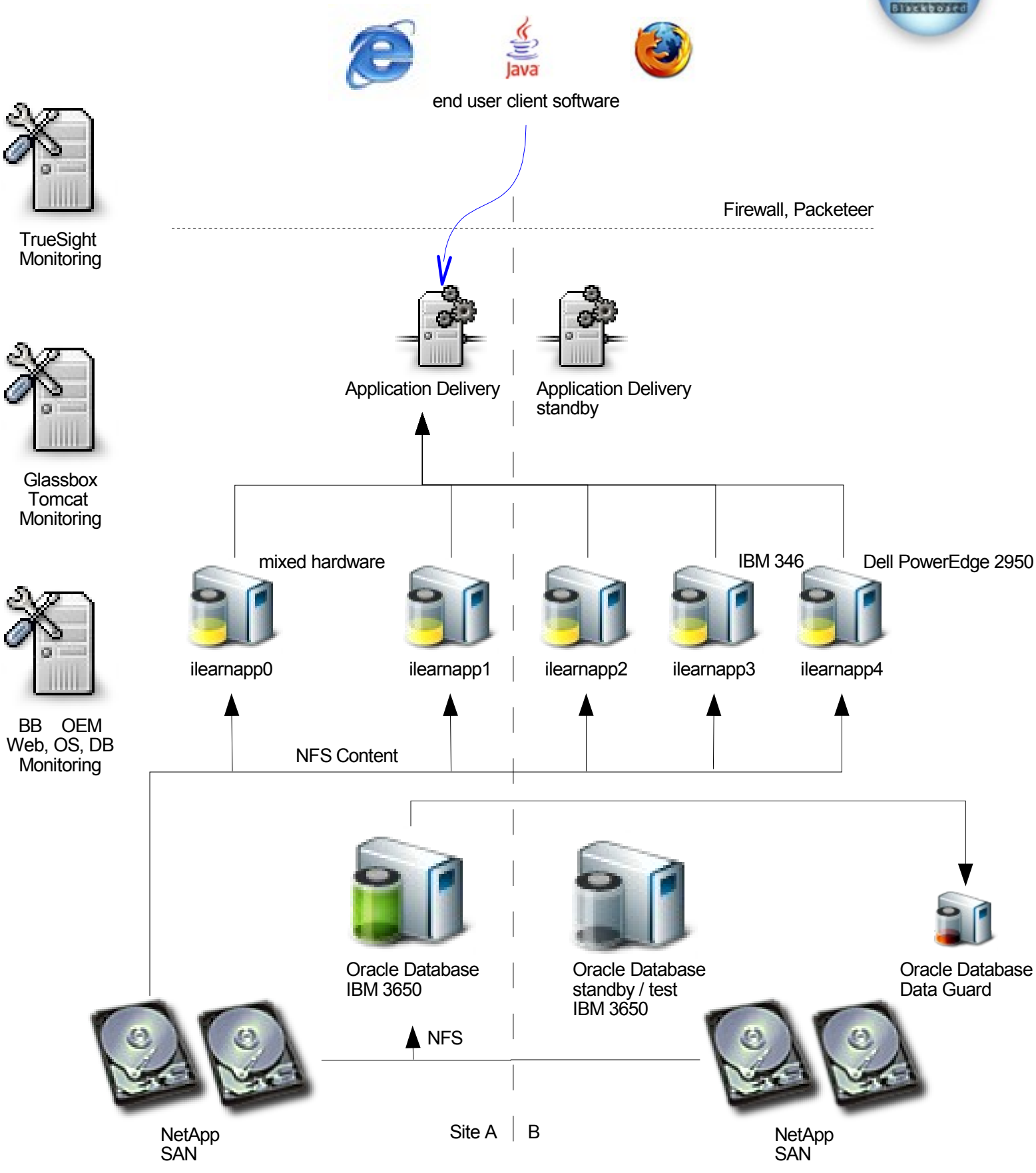
2. Direct stateful sessions to the application servers cause multi-url environment and bind users to servers which may slow down or fail.

3. NFS sharing from ilearnapp0 makes it a single point of failure. It is also limited by resources of the server.

4. SAN is a single point of failure.

5. The database is a single point of failure.

Resilient BB LS Architecture



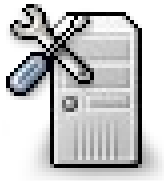
4/8/2008

Resilient BB LS Architecture with virtualization

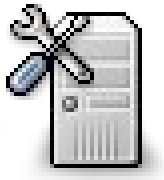
end user client software

Firewall, Packeteer

TrueSight Monitoring



Glassbox Tomcat Monitoring



BB OEM Web, OS, DB Monitoring

NFS Content

Application Delivery

Application Delivery standby

2 blade servers dedicated to production app servers

2 blade servers dedicated to production app servers

1 blade server dedicated to production database RAC server 10GbE

1 blade server dedicated to production database RAC server 10GbE

Oracle Database Data Guard

NetApp SAN

NFS

NetApp SAN

Site A | B

Standard resilient architecture:

Benefits:
This architecture leverages hardware and system design which has been proven to work on GRCC campus. It also follows closely the recommendation from Blackboard in their hardware sizing documents to use hardware systems for both application servers and the database. Blackboard suggests powerful database servers: "We recommend 16GB to 32GB of memory per system" (BB Dell hardware sizing doc). The IBM 3650 has 48GB of RAM to allow for future growth and no hardware update for 1-3 years.
In order for Oracle to use any amount of memory above 4G for SGA operation a 64bit system is required.
The failover approach to the database business continuity represents a balance between simplicity of the database operations and the need for running a database in two locations. In case of a failure in location A, the database can be started in location B within 15 minutes. The production database system would run at 100% of capacity in location B in case of location A failure.
The hardware used in this solution is generic and can be re-deployed to other network services or applications.
The complexity of application maintenance and their design is identical to implementation in virtualized environment. The hardware maintenance of stand-along systems impacts one system at a time and is less visible to the application overall. Mirrored hard drives and reliable, mature Intel hardware lends itself well to low effort operations.
This architecture can be deployed speedily and will provide resilient approach for the next 1-3 years without modifications. The costs of keeping this architecture under warranty can be gradual.

Considerations:
1U or 2U servers (U stands for unit of height in a rack furniture) can take up more physical space and consume more electricity than virtualization technology. Maintenance of the hardware in stand-alone servers may require more effort, especially on servers which are out of warranty.
Running the database in non-clustered environment requires human intervention in case of a serious failure in location A.

Resilient architecture with virtualization:

Benefits:
Using hardware blades provides considerable gains in physical and environmental properties of the data center. More servers can be installed in smaller spaces with blades. There are considerable energy use gains when implementing blade servers which share certain hardware resources. Conceivably, when there is fewer hardware pieces the hardware maintenance may be decreased. If most of the stand-alone hardware can be replaced with blade servers, this would standardize the data center operations.

Considerations:
Existing hardware cannot be leveraged.
Blade servers come in chassis or groups which cannot be easily split to a third location. Also the hardware may not be as flexible in re-deployment as stand-alone servers.
When the blade servers come out of warranty the replacement costs will not be gradual or staged.

Solution summary:

The standard resilient architecture leverages existing hardware for the application servers and allows for gradual replacement of the IBM x346 family of servers. It requires a duplicate 64bit database server to provide business failover and continuity plan. The architecture is a standard Blackboard architecture with proven performance, support structures, and troubleshooting methods.

The virtualization architecture allows more compact and efficient physical server properties as well as more environment friendly operations. The hardware choices may be limiting for re-deployment to other applications in comparison with more generic stand-alone server hardware. Costs of keeping blades under warranty cannot be staged. RAC implementation helps to standardize and share Oracle resources across other then Blackboard databases.

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References:

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