Introduction to Grid Pilot Project

Development of Grid Based Online Game Service

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Agenda

I. Project Overview
   1. Grid Pilot Project Background

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   2. Scheduling Policy for Game Service
   3. Grid Monitoring
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   1. Grid Based Online Game Service Operation

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   1. Benefit of Grid Based Online Game Service

V. Prospects
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I. Project Overview
1. Grid Pilot Project Background

Need for Grid Based Online Game Service

Overcoming Resource Utilization Inefficiency Due to Environmental Factors

Unlike electrical power, Internet network service cannot be delivered at the uniform quality unbounded by time or location. That increases the hardware burden on the service providers to ensure stable delivery of the service. (Lack of continued real-time response)

Solving the Overload Problem Due to User’s Habits

Since the user connection to the server is not distributed uniformly, the load to the system drastically increases during the time of concentrated connection. (Degraded service quality due to traffic hike)

Increased Efficiency/Stability from Application of Grid Technology

[Service System Operation Enhancement / Customer Service Quality Improvement]
II. Development of Grid Based Online Game Service
1. Servers for Grid Application

1.1. ‘Korean Card Game’ Server Hardware for Grid Application

- Game Server Pool
  - Game Server 00
  - Game Server 01
  - Game Server 02
  - Channel Server, Grid Managing Server

- Database
  - Middleware Server
  - Game Database Server
  - Log Server

- Middleware Server

- Switch Hub

- FireWall

- Internet

- Client PC

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1. Servers for Grid Application

1.2. ‘Korean Card Game’ Logical Server Structure for Grid Application

- **Channel Server**, **Game Server Manager**
- **GT4**, **Condor**
- **Grid action logger**, **Game Server**
- **Direct Communication To Game Server**, **Log data**
- **Condor Communication**
- **Grid action logger**, **Condor**
- **Game Server N**
- **Launch/Down Control**
2. Scheduling Policy for Game Service

2.1. Scheduling Logic for Channel Server with Grid Application

Start

- **Initial Operation Decision**
  - Is there one or more game servers in operation? **Yes**
  - Is there any game server with \( N \) or less number of concurrent users? **Yes**
  - Is there any game server in operation for \( T \) period or longer and with \( M \) or less number of concurrent users? **No**
  - Demon Down Criteria Test
    - Is there any hidden game server with no connected user? **Yes**
      - Request shutdown of the game server
    - Is there any game server in hiding? **No**
      - Hide the game server
  - Is there any game server in hiding? **No**
  - Request the operation of the game server to the node pool through Condor

- **Overload Decision**
  - Is there any game server with \( N \) or less number of concurrent users? **Yes**
    - Expose the hidden game server
  - No

- **Idle Server Identification**
  - Is there any game server in operation for \( T \) period or longer and with \( M \) or less number of concurrent users? **Yes**
    - Hide the game server
  - No

- **Additional Operation Decision**
  - No

End

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2. Scheduling Policy for Game Service

2.2. Operation/Hiding/Shutdown of a Game Server

**Operating a Game Server**

- Channel Server
- Grid Managing Server
- GT4
- Condor
- Game Server Manager
- Game Server N
- Grid action Reporter

Binding a game server (node selection)
2. Scheduling Policy for Game Service

2.3. Operation/Hiding/Shutdown of a Game Server

Hiding a Game Server

Channel Server, Grid Managing Server

Game Server M

Game Server N

GT4

Condor

Condor

Grid action Reporter

Game Server
2. Scheduling Policy for Game Service

2.4. Operation/Hiding/Shutdown of a Game Server

Shutting Down a Game Server
3. Grid Monitoring

3.1. Monitored Data

- Total resource utilization and hourly change for each server node
- No. of concurrent users and hourly change of the serviced game server for each server node

Game Server A

- VSGostop-00
- VSGostop-01
- VSGostop-02
- Gostop-00

Game Server B

- VSGostop-03
- Gostop-00

No. of concurrent users of the game servers

Total resource utilization rate for each server node

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4. Benefits of Grid Application

4.1. Benefits of Grid System

▶ Reduced Hardware Expense For the Same Level of Service Quality

Original Model
3 Machines in Use for 6 Demons

Grid Enhanced Model
2 Machines in Use for 6 Demons

▶ Flexible arrangement of the game servers to encourage the user concentration with the benefit of community concentration.
III. Grid Based Online Game Service Operation
1. Grid Based Online Game Service Operation

1.1. Service Operation

A. Providing a game site for the users to experience the grid system

- Step 1: Operation of the test game to verify the stability of the grid system
- Step 2: Operation of the commercial games to verify the efficiency of the grid system

B. Link between the contents to attract more users
- Banner and site link installed on other game client

C. Customer support window to ensure user convenience and management
- Customer Center (FAQ, Q&A, E-mail) / Call Center / Visit Service

D. Study of the games with grid system
- Understanding of the user requirements and presentation of the system improvement direction

E. System monitoring / fault processing and backup / security monitoring / operation DB

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1. Grid Based Online Game Service Operation

1.1. Service Operation

**F. Promotion**

<table>
<thead>
<tr>
<th>Attracting New Subscribers</th>
<th>The users’ visit to the game sites are recorded, and the various incentives of visiting the game sites are offered to attract more uses.</th>
</tr>
</thead>
</table>
| Incentives of Playing Games | 1. Awards according to the game score, mission accomplished and playing time.  
                                      2. Awards according to the game result as an incentive for the users to plan the game longer. |
| Encouragement of User Participation | Outstanding Reporter Award: The users posting good reports are awarded with gifts to encourage them to present more opinions to improve the service. |
| Public Promotion | Events linked with the various services (search, blog, etc.) of Empas |
IV. Results
1. Benefits of Grid Based Online Game Service

1.1. Efficiency of using resource is improved

A. Efficiency of Software resource is improved

**Efficiency of Software resource is 65% up**

Daemons for Game are operated (bind / down) by scheduling system that is under the control of Grid System.

- **Condition**
  - 2,100 of users are using online game service

**Table 1. comparison between Normal System and Grid Based System**

<table>
<thead>
<tr>
<th></th>
<th>Number of Daemon (bound / reserved)</th>
<th>max receptible users</th>
<th>Efficiency of Software Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid Based System</td>
<td>11/35</td>
<td>2200</td>
<td>95%</td>
</tr>
<tr>
<td>Normal System</td>
<td>35/35</td>
<td>7000</td>
<td>30%</td>
</tr>
</tbody>
</table>

**Graph 1. comparison between Normal System and Grid Based System**

\[\text{Efficiency of Software Resource} = \frac{A}{B} \times 100\]

- **A : Number of users who are connected in service**
- **B : max receptible users**
1. Benefits of Grid Based Online Game Service

1.1. Efficiency of using resource is improved

B. Cost for Hardware resource is saved

Cost for Hardware resource is 75% down

Machines for service are operated (used / down) by scheduling system that is under the control of Grid System.

- **Condition**
  - 2,100 of users are using online game service

<table>
<thead>
<tr>
<th>Table 2</th>
<th>comparison between Normal System and Grid Based System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Machine (used / reserved)</td>
</tr>
<tr>
<td>Grid Based System</td>
<td>1 / 5</td>
</tr>
<tr>
<td>Normal System</td>
<td>5 / 5</td>
</tr>
</tbody>
</table>

Graph 2: comparison between Normal System and Grid Based System

- Coefficient of Utilization [machine] (%) = used machine / reserved machine *100
- Coefficient of Utilization [daemon] (%) = bound daemon in a day / max receptible daemon * 100
1. Benefits of Grid Based Online Game Service

1.2. Boom up the user community

A. Coefficient of gathering who connect the service is improved

Coefficient of gathering is 82% (max) up
Game channels that users can connect is controlled (visible / invisible) by scheduling system that is under the control of Grid System.

[Graph3. comparison between Normal System and Grid Based System]
V. Prospects
1. Prospects of Grid Based Online Game Service

1.1. The Future of Grid Based Online Game Service

* A business – R&D about game service for better quality / New Project - will be activated.

* Online Game Service will be united.

People will be use every service in any site that furnish online game contents with the other people in every world.
End