Position Presentation
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Background

- **Web Service Operation Experiments**
  - KOSHIEN Live Projects (1999, 2001)

- **Network System Management Research**
  - Network System Automatic Control (NSAC)’s project (2008-2009/Spring)
Feature of Web Service

- Dynamically change the number of requests
  - Peak throughput = 5~20 times usual throughput
- Rapidly increase work load and decrease soon
  - Each time of peak load = several min.
  - Total time of peak load /year = several hours or days
Poor Scenario in Real Operation

- When customer’s URL appears on Yahoo topic index...
  - Suddenly start to increase the traffic of the customer’s web service system
  - But...
    - customer’s web service system developed by FIXED servers and FIXED network configuration
    - If customer wants to expand their capacity
      - It takes long time for many operations configurations and pictures/documents to describe the system ...
    - Can’t change capacity of web service system quickly

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What is a Happy Scenario?

- When customer’s URL appears on Yahoo topic index...
  - Suddenly start to increase the traffic of the customer’s web service system
  - If we can automatically configure the network system,
    - Monitoring system notices the change of metrics, such as throughput, number of connections, web server load (CPU, memory, DISK I/O) and etc.
    - Calculate the necessary number of additional server machines and bandwidth (= application side requirement)
    - Calculate the configurable allocations from server and network resource pool
    - Configure SWs and web servers
For the Happy Scenario

- **Start working small parts of this scenario**
  - Monitoring system notices the change of metrics, such as throughput, number of connections, web server load (CPU, memory, DISK I/O) and etc.
  - Calculate the necessary number of additional server machines and bandwidth (= application side requirement)
  - Calculate the configurable allocations from server and network resource pool
    - Data Model of VLAN based network system in Data Center
    - Describe network system structure of one thousand servers and SWs (in Data Center) using with the data model
  - Configure SWs and web servers
    - NSAC (Network System Automatic Control)
Data Model of VLAN based network system in Data Center

- **Nodes**
  - SW server, Server Hardware, each NIC, L2_I/F, ..

- **Relations**
  - Inclusion relation (include/included)
    - ex. SW includes NIC ports
    - include/included between {SW server/Server Hardware} and NIC
  - Hierarchical relation (up/down)
    - ex. between nodes between adjoining layers
    - up/down relation between NIC and L2_I/F
  - Horizontal relation (forward/backward/non-direction)
    - ex. between nodes on same layer
Relations between NICs

(Node-A, Node-B, Relation)

- (17, 40, non-direction) and (40, 17, non-direction)
Relation between L1 and L2

(Node-A, Node-B, Relation)

- (13, 17, down) and (17, 13, up)
Relation between L2_I/Fs

- (Node-A, Node-B, Relation)
  - (13, 21, forward) and (21, 13, forward)
VLAN network

(Node-A, Node-B, Relation)

- (33, 13, include) and (13, 33, included)
For the Happy Scenario, again

- Requirement from application?
- How can efficiently resource allocate in DC?
- What entities are there in DC network systems?
- What relations are there between entities?
- What kind of graphs are there?
- What kind of scenario can adapt for the graphs?
- Configuration using with the graphs
- ...