

# Storage Area Network Management Modeling Simulation

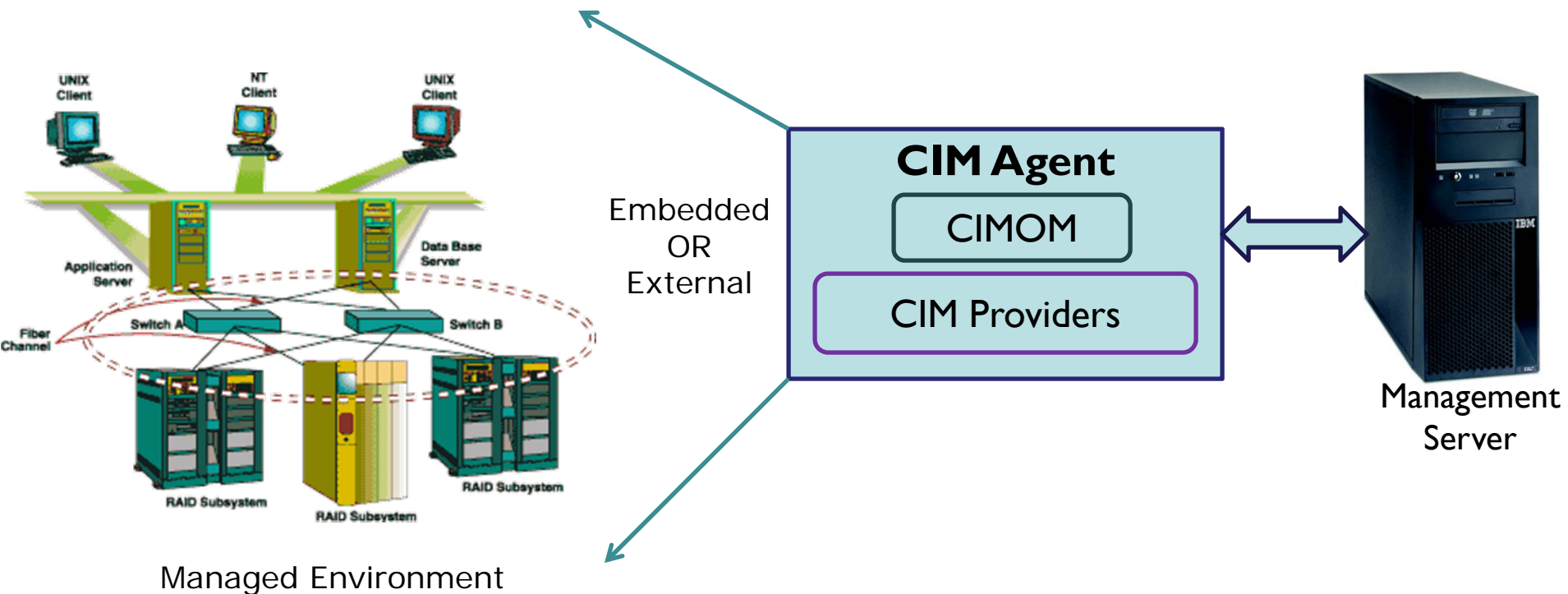
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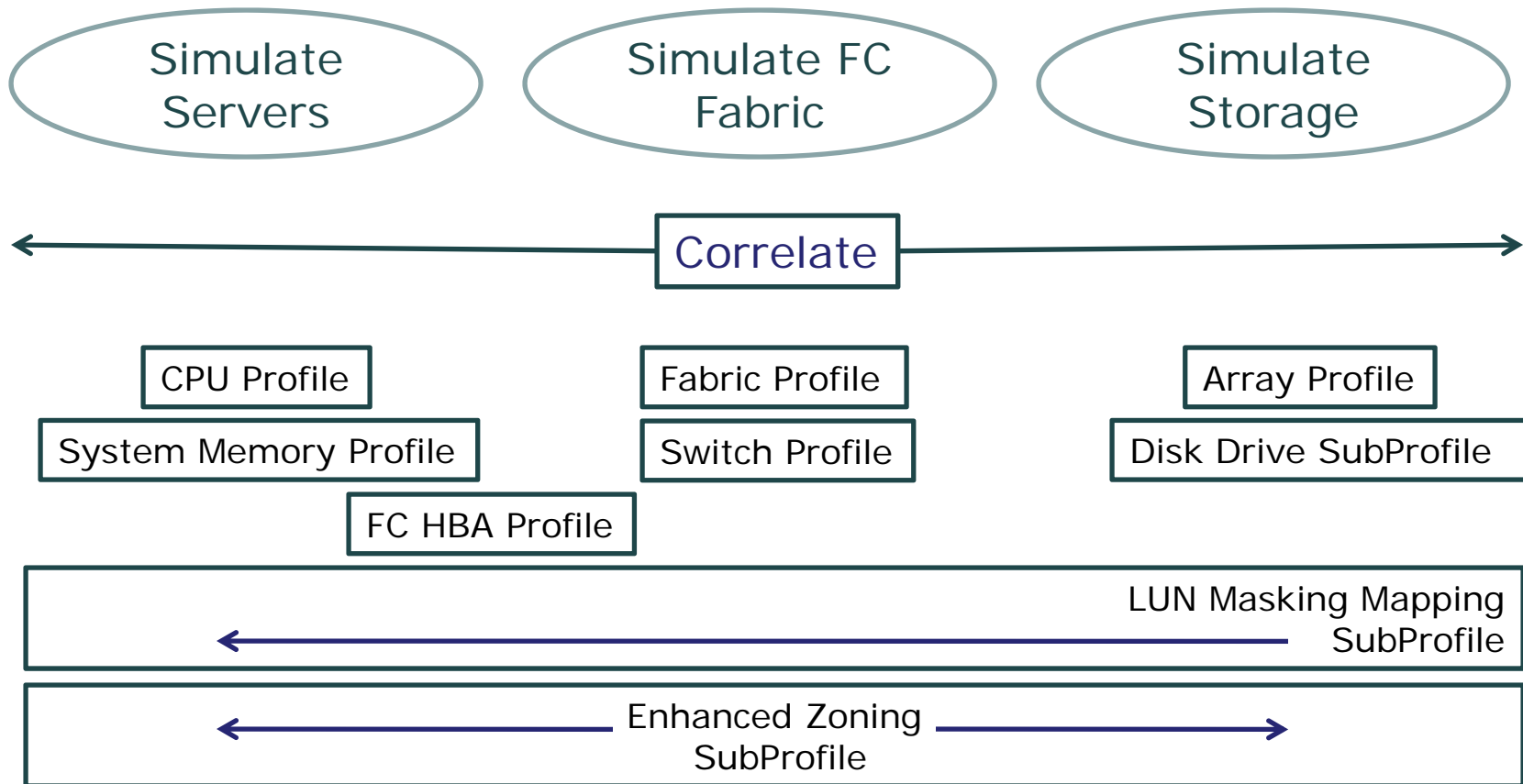
- ❑ Background
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  - ❑ Configuration Mode
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- ❑ *The bottom line? Enterprises report that IT operational overhead is reaching up to 70 percent of the overall IT budget. And that number is growing—leaving precious few resources for new initiatives.*
- ❑ *Worldwide storage management software market revenue totaled \$10.6 billion in 2007, a 12.2 percent increase from 2006 revenue of \$ 9.4 billion*

# Background



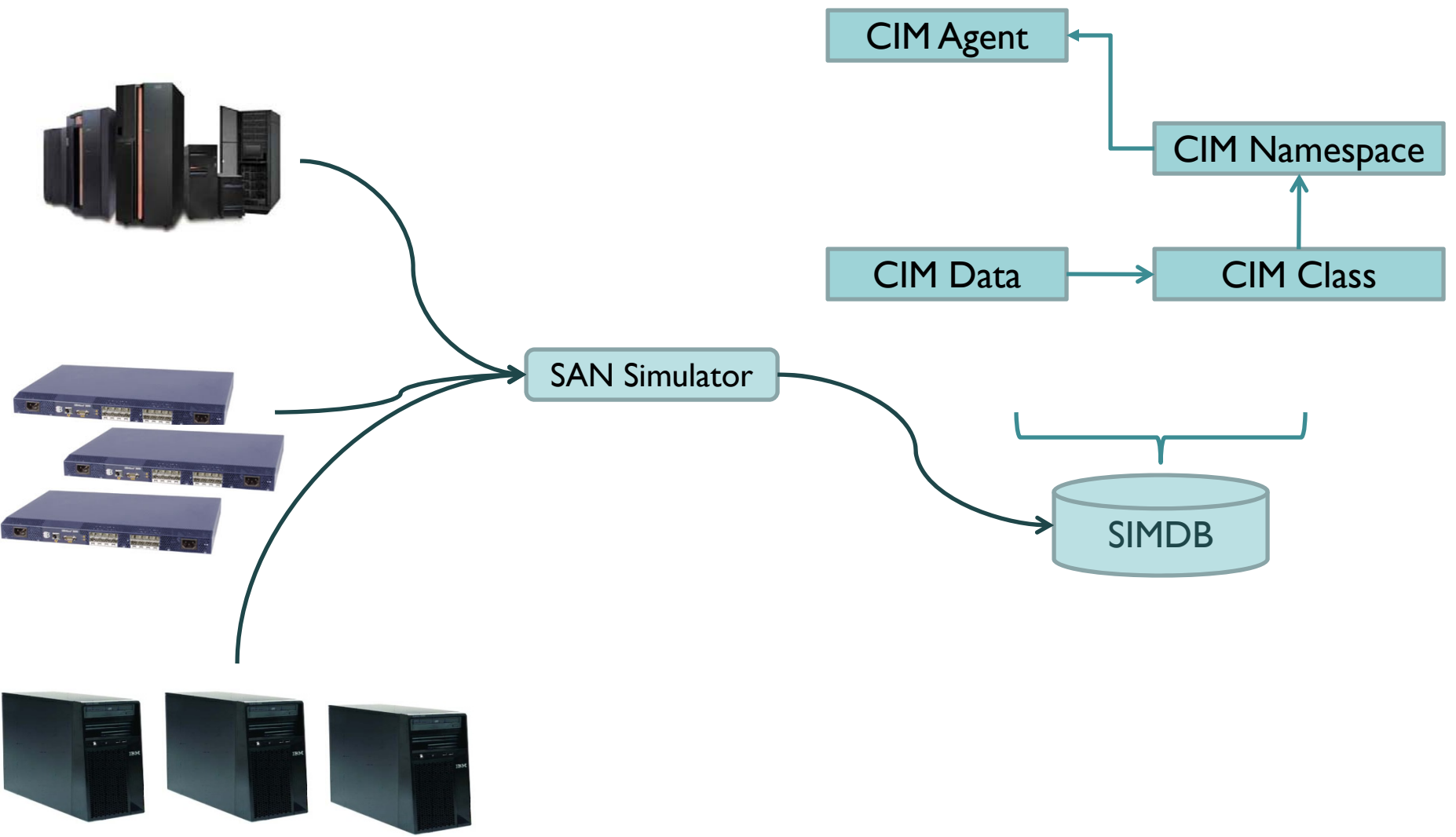
# SAN Simulation



# Modes of Operation

- ❑ Snapshot Mode
- ❑ Configuration Mode
- ❑ What-if Analysis

# Snapshot Mode



- ❑ Point to live CIM Agent
- ❑ Uses standard CIM Client
  - ❑ Read CIM class definitions, construct MOF file
  - ❑ Traverse namespaces
    - ❑ For all CIM classes, enumerate Instances
    - ❑ Copy CIM Instances. Construct indexes
      - ❑ Point-in-time copy (Freeze CIM Agent or Subscribe Indications)
  - ❑ Record-Replay for Performance Data



# Snapshot Mode

1. Create CIMClient (CIM Agent Credentials)
2. Traverse Server Profile. Collect Namespaces
3. For each Namespace
  - {
  - snapshotClasses(Namespace)
  - }
4. Build Association Indexes(GlobalAssociationClassList)

```
3.snapshotClasses(Namespace)
{
    enumerateClasses();
    for each CIMClass
    {
        enumerateInstances();
        record CIMData();
        if (AssociationClass)
            Add to globalAssociationClassList
    }
}
```

# Configuration Mode

- ❑ High level user device specification
- ❑ Progressive specification
- ❑ Naming conventions pre-canned
- ❑ Generate Data . Store in DB. Serve through Provider
- ❑ Incremental update of specification

# Configuration Mode

```
#Type of storage system
STORAGE_SYSTEM=DS8000

#Number of storage system
NUMBER_OF_STORAGE_SYSTEM=1

# Number of ports
NUMBER_OF_PORTS=8

# Total number of volumes
NUMBER_OF_VOLUMES=15

# Total number of Pools
NUMBER_OF_POOLS=5

# Total number of Array Sites
NUMBER_OF_ARRAY_SITE_EXTENT = 10

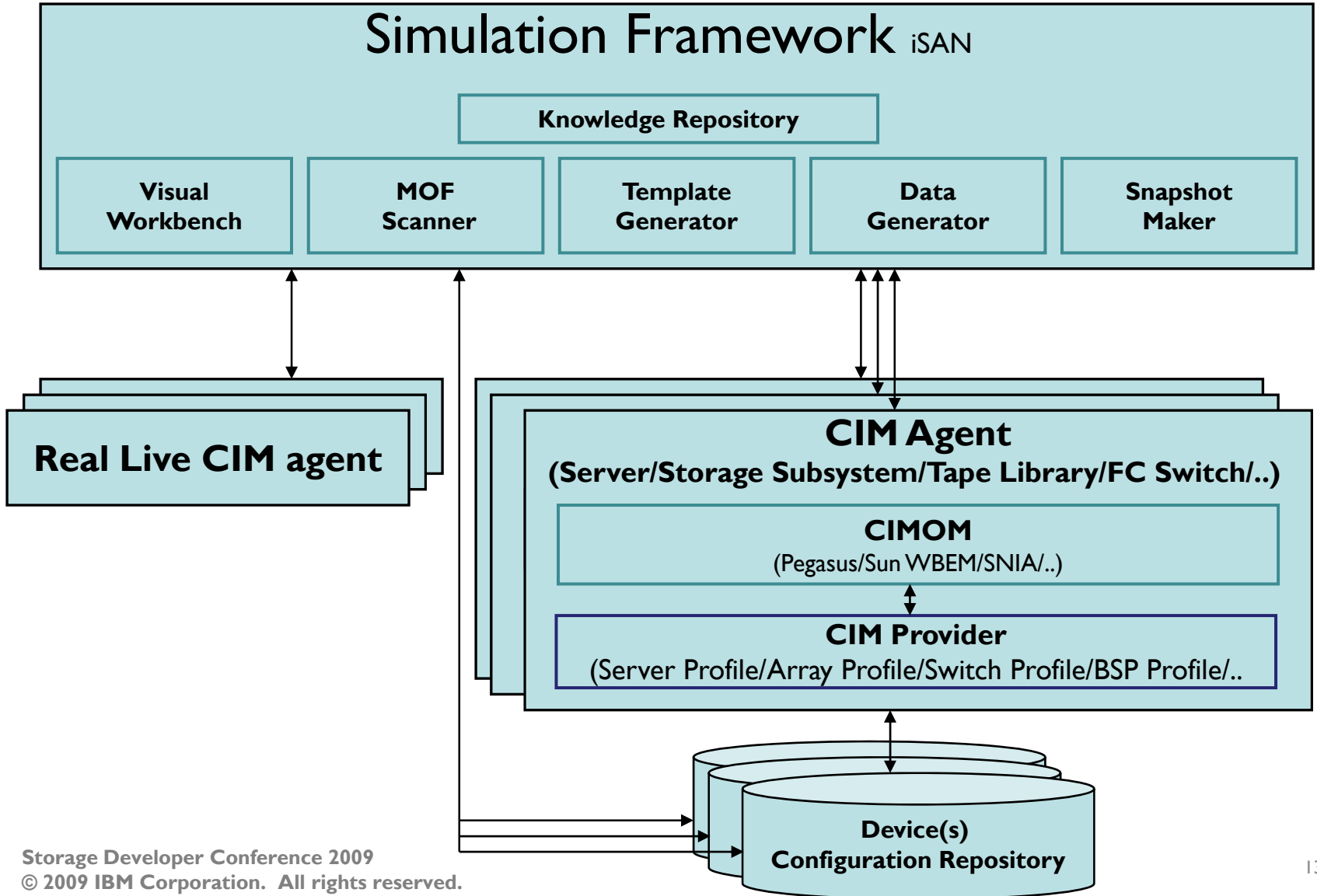
# Mapping of Pool to Volume
MAPPING_POOL_TO_VOLUME=4 2 2 4 5

#Mapping from Arraysite to Pool (Disk to Pool)
MAPPING_ARRAYSITE_TO_POOL=2 2 2 2 3
```

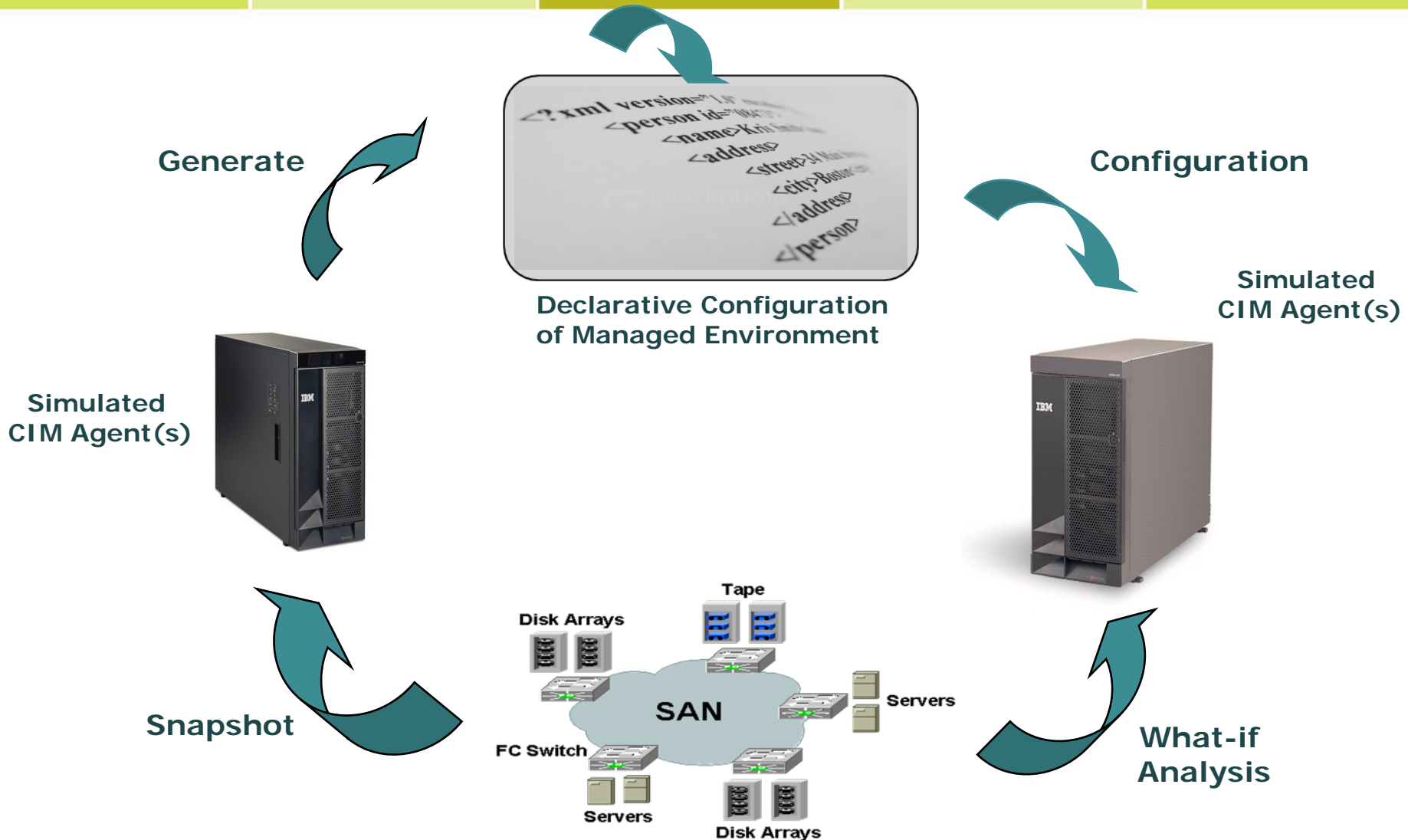
# Configuration Mode

```
<SanConfigGenerator>
  <workloads>
    <workloadprofile name="wpd1" IODemand="" XferSize="4"
      ReadPercentage="100" WritePercentage="0" SequentialRead="100"
      equentialWrite="100" ReadHitPercentage="50"
      Utilization="Volume">
      <trendprofile>
        <range RangeLowerBound="60" RangeUpperBound="80" />
        <pattern Type="Random" Change="5" Cyclic="Yes"/>
        <time Length="60" Unit="minute" />
      </trendprofile>
      <attachement>
        <volume name="volume1" ></volume>
        <fcport name="port1" />
      </attachement>
    </workloadprofile>
    .....
  </workloads>
</SanConfigGenerator>
```

# Architecture



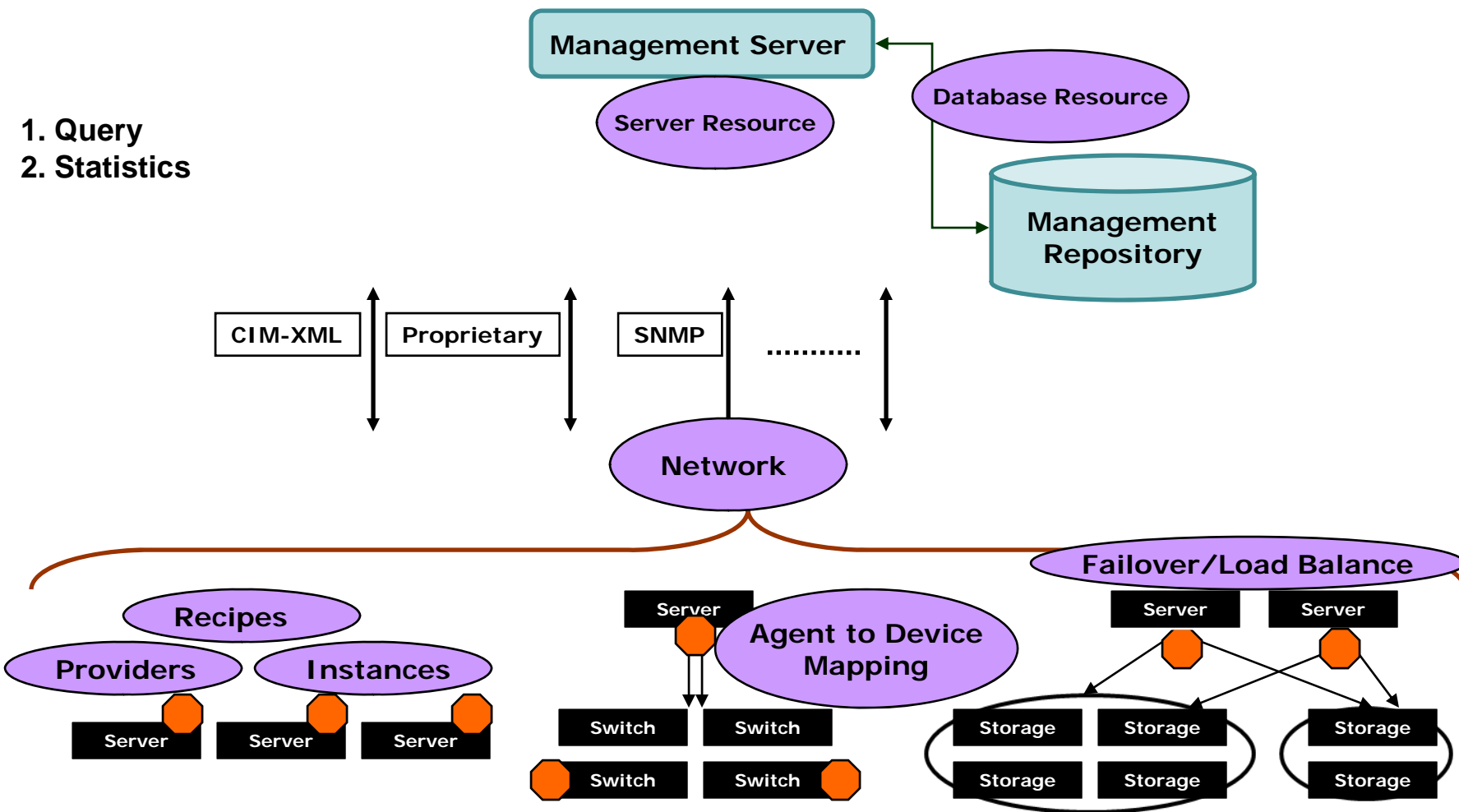
# What-if Analysis



- ❑ Control Functions (*invokeMethod*)
- ❑ SNIA Lab. Mirror
- ❑ Conformance Testing
- ❑ Automated Management Server Testing

## Large Scale Clustered File System Simulation

- 1. Query
- 2. Statistics





# Questions ?

**Thank You!**