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Now that you have z/OS CIM configured, what can it do for you?

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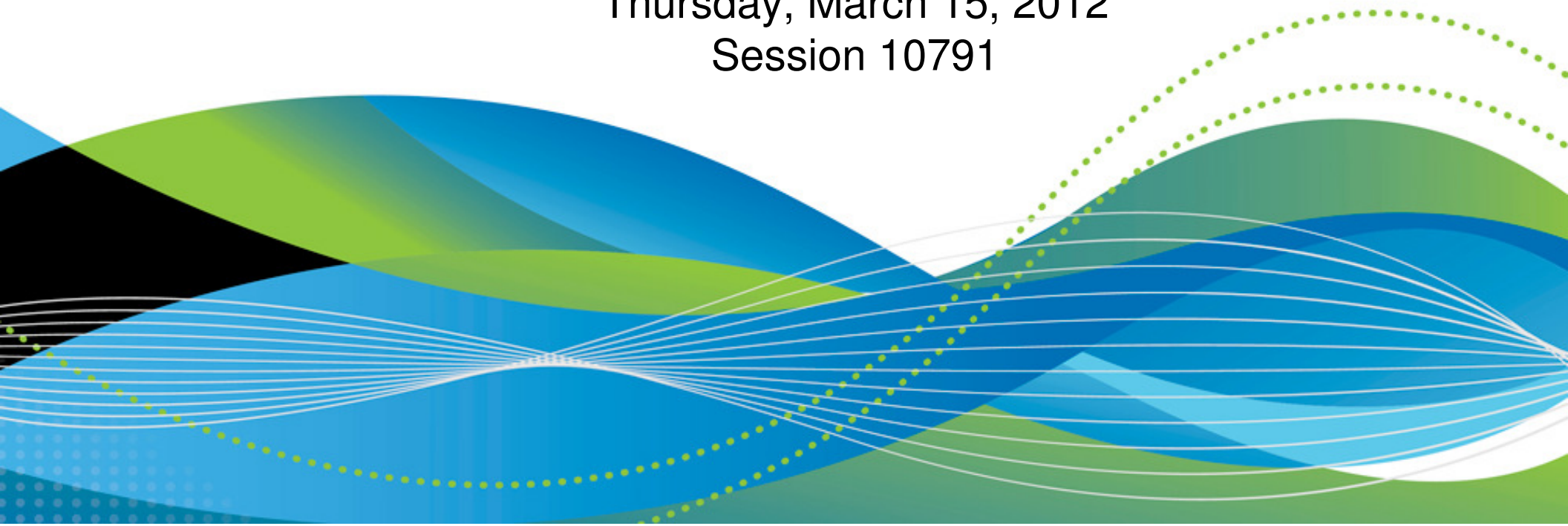
Session 10791

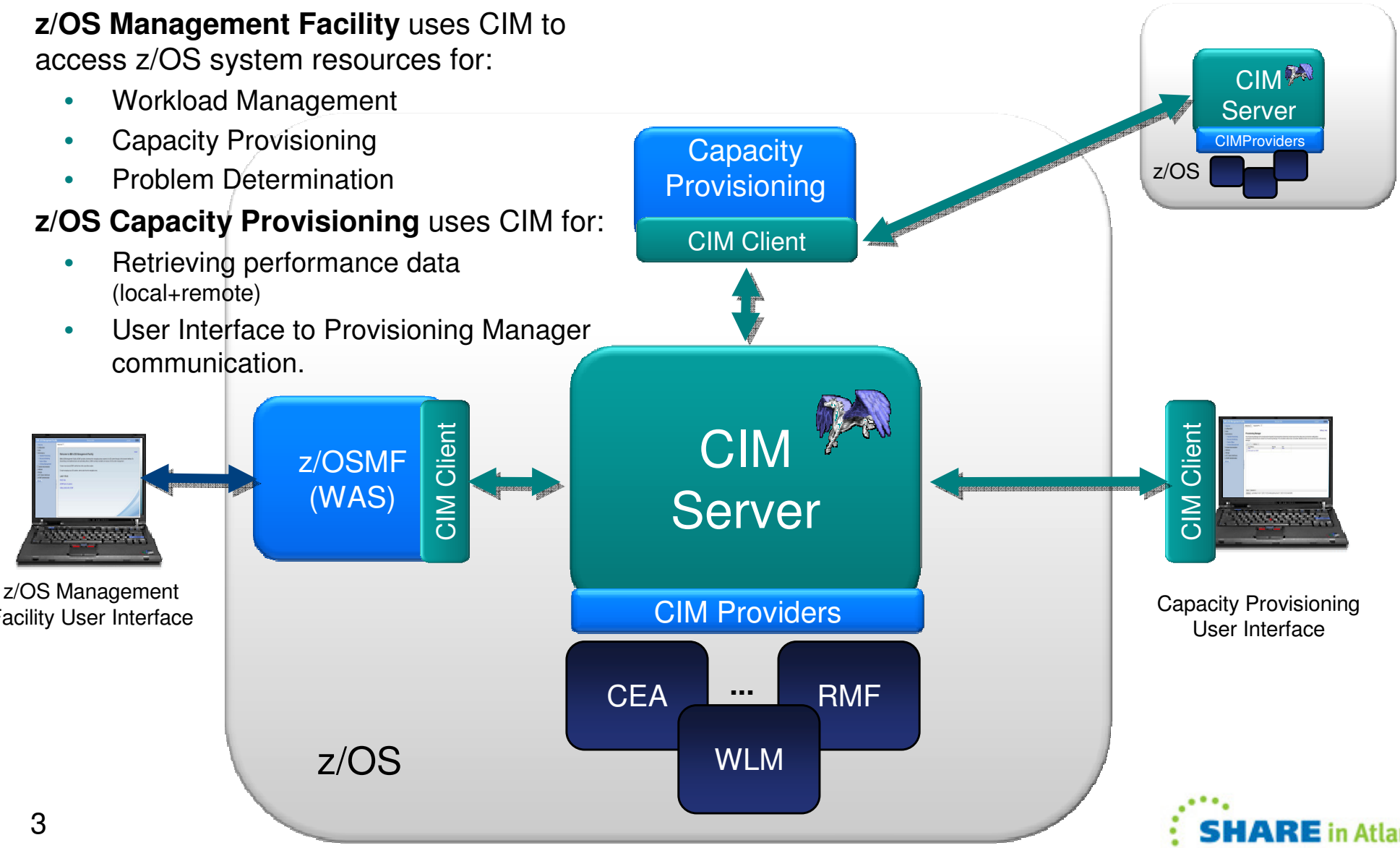


Agenda

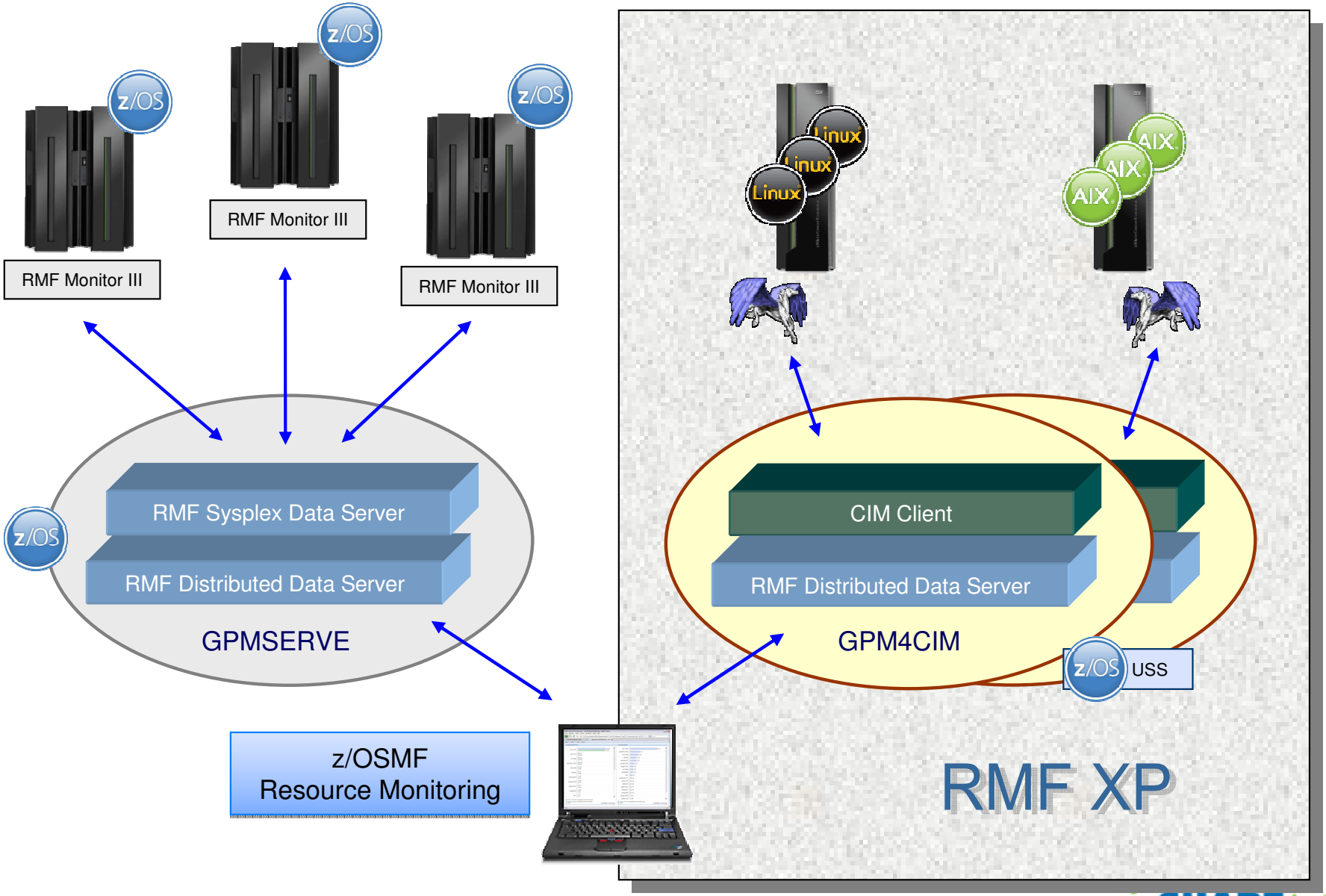
- Explanation of how CIM is used on z/OS today
- Introduction to the concepts of CIM
  - What is it?
  - For what is used?
- Description of the z/OS CIM components
- What information is available through z/OS CIM
- What CIM can do for you …
  - As an adminstrator
  - As a developer

Use of z/OS CIM today
z/OSMF and z/OS Capacity Provisioning

- **z/OS Management Facility** uses CIM to access z/OS system resources for:
  - Workload Management
  - Capacity Provisioning
  - Problem Determination
- **z/OS Capacity Provisioning** uses CIM for:
  - Retrieving performance data (local+remote)
  - User Interface to Provisioning Manager communication.



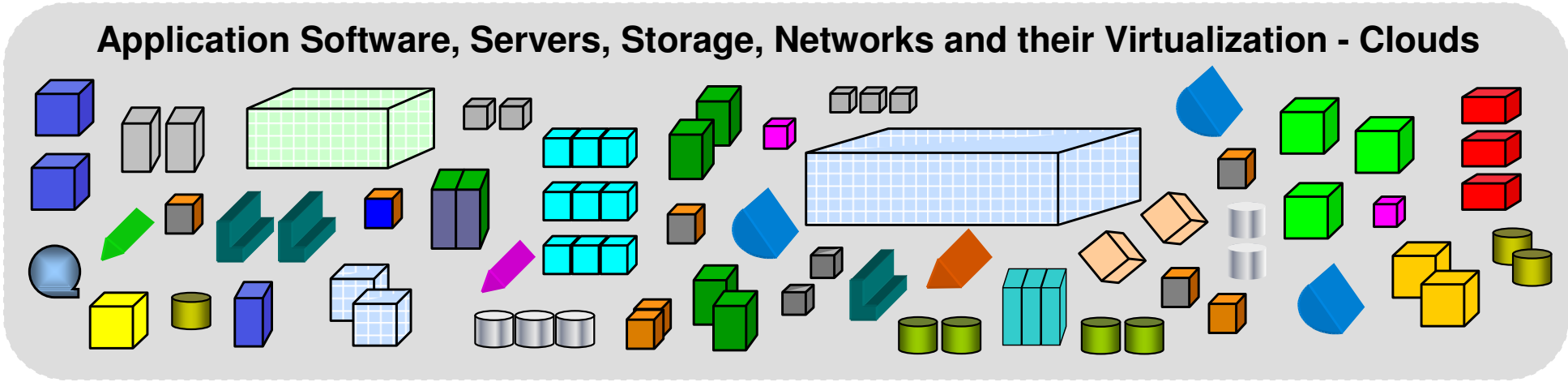
Use of z/OS CIM today
RMF XP



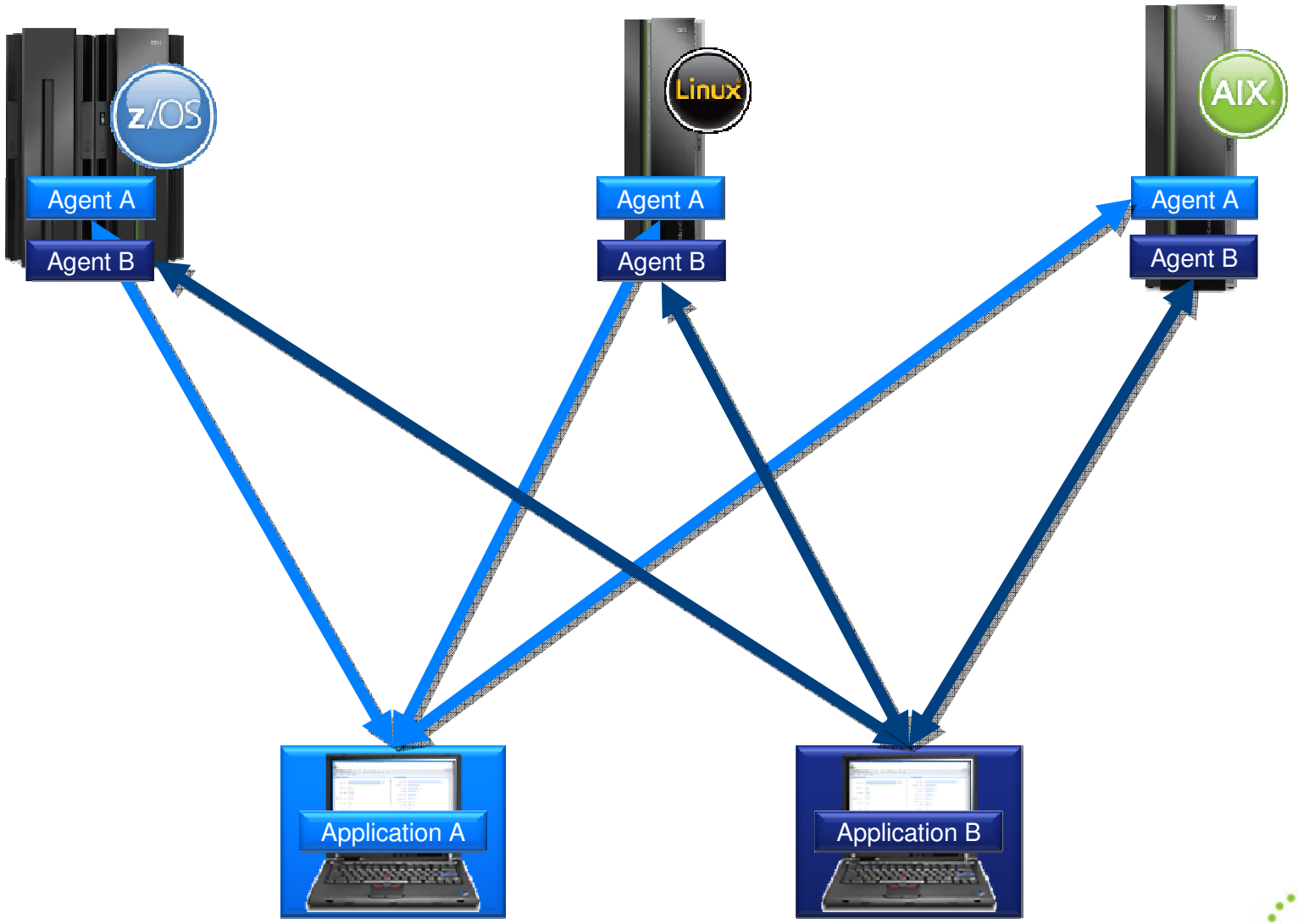
Managing the Enterprise

Raising complexity of IT environments:

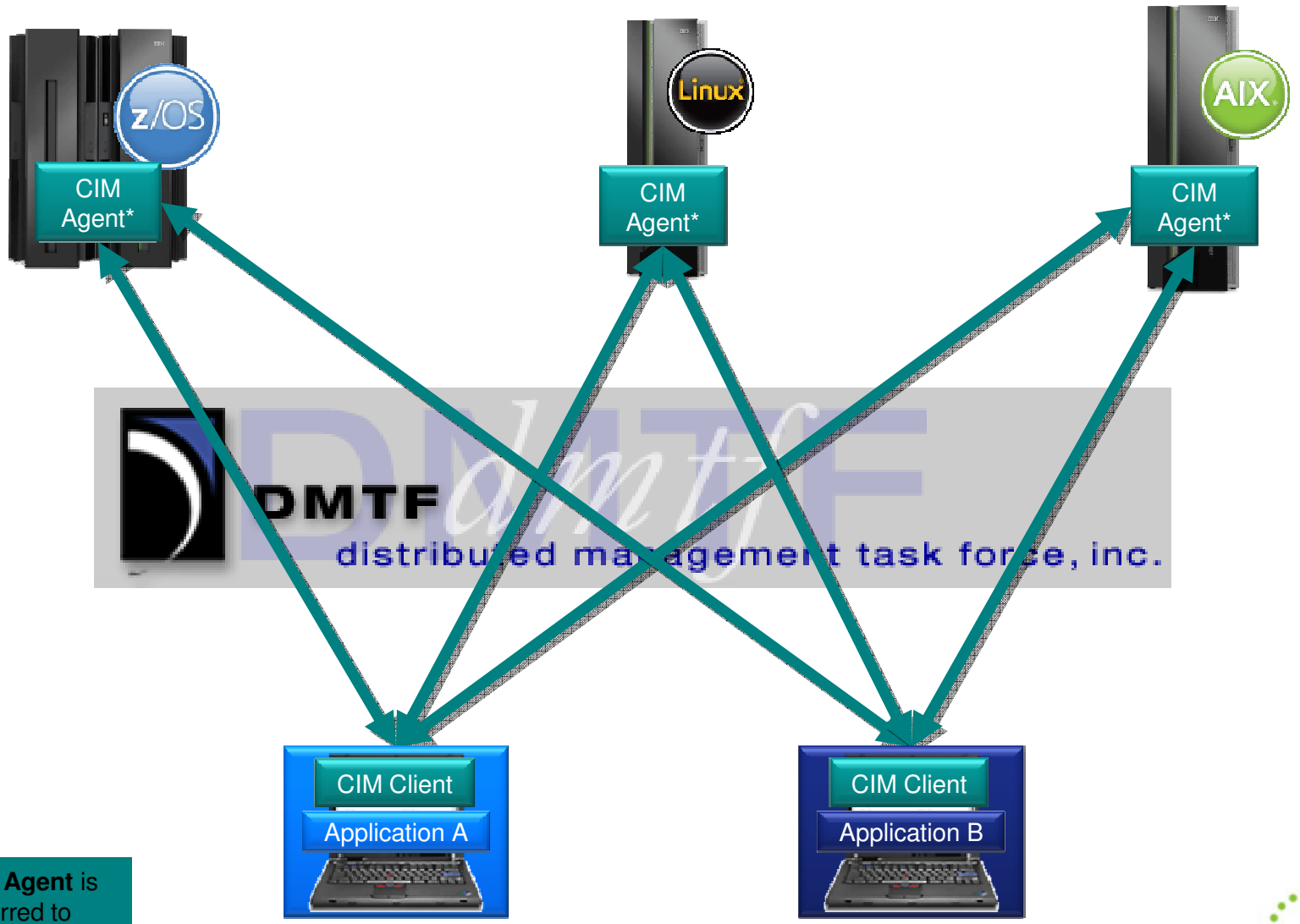
- Applications run distributed across servers, storage systems and networks.
- Variety of different hardware and software
- Every vendor has its own set of management solutions



Systems Management Example

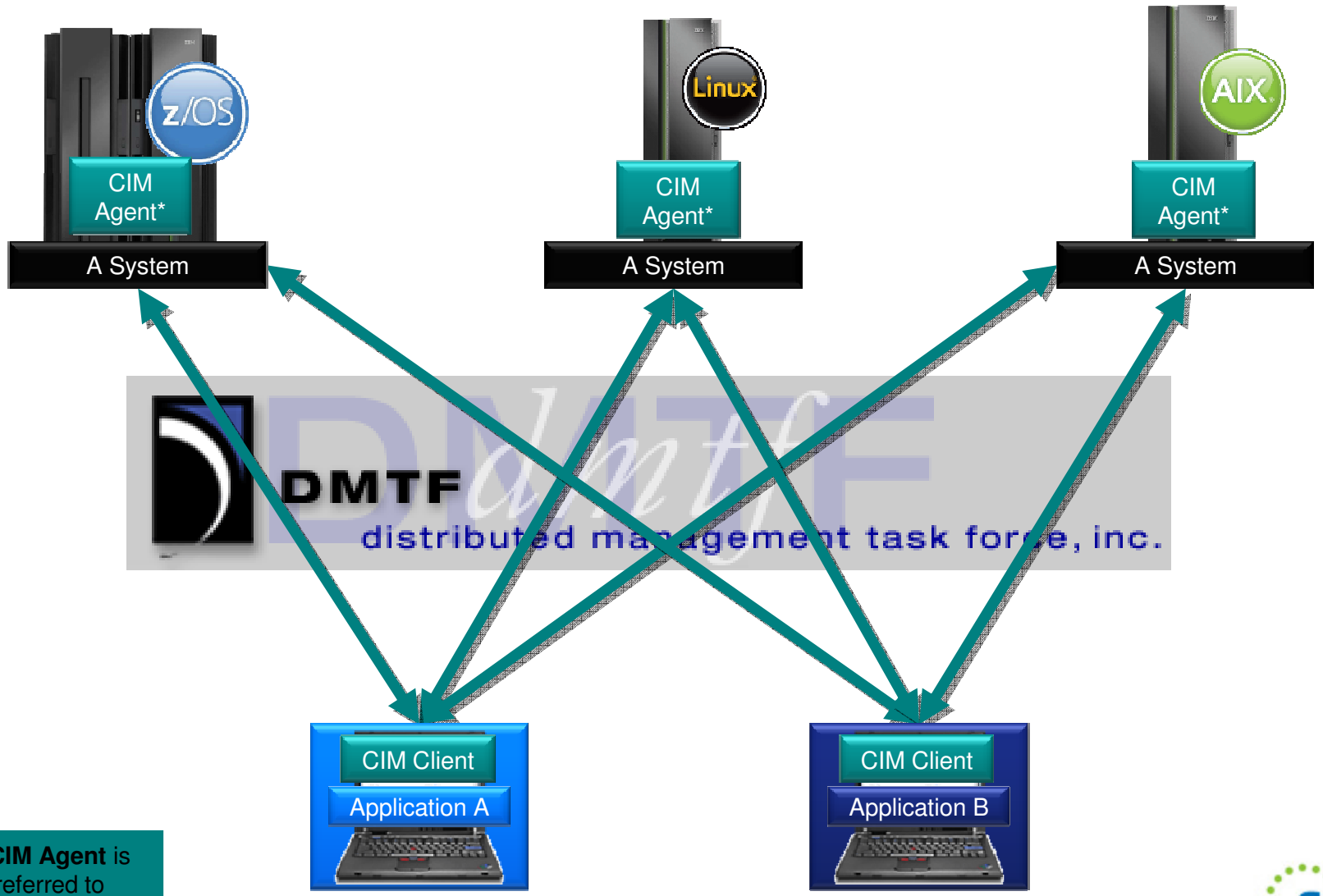


Systems Management Example with CIM



*The **CIM Agent** is also referred to as the **CIM Server**

Systems Management Example with CIM Logical View



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DMTF Management Standards

DMTF = “Distributed Management Task Force” - www.dmtf.org

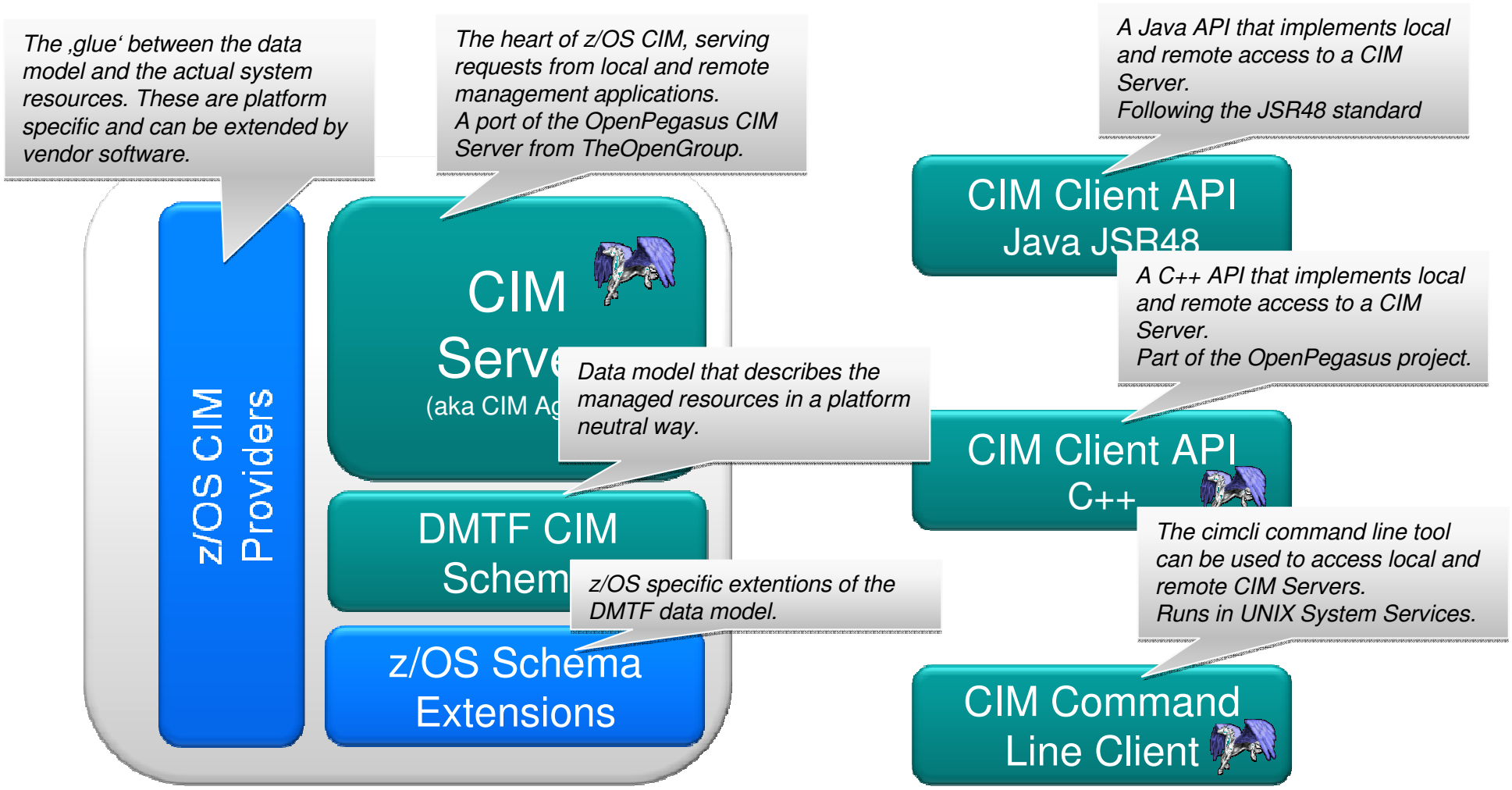
The DMTF defines open standards for the management of distributed systems:

- CIM (Common Information Model)
  - Data model to represent IT resources
  - Independent of any specific platform or technologies
- WBEM (Web Based Enterprise Management)
  - Defines the protocols and interfaces for access to CIM data models.
  - Based on standard-technologies like XML, HTTP and Web services
- *more ....*

CIM and WBEM together enable Interoperability between vendors of hard- and software and vendors of management solutions.

Almost all larger vendors of hard- and software are members of the DMTF

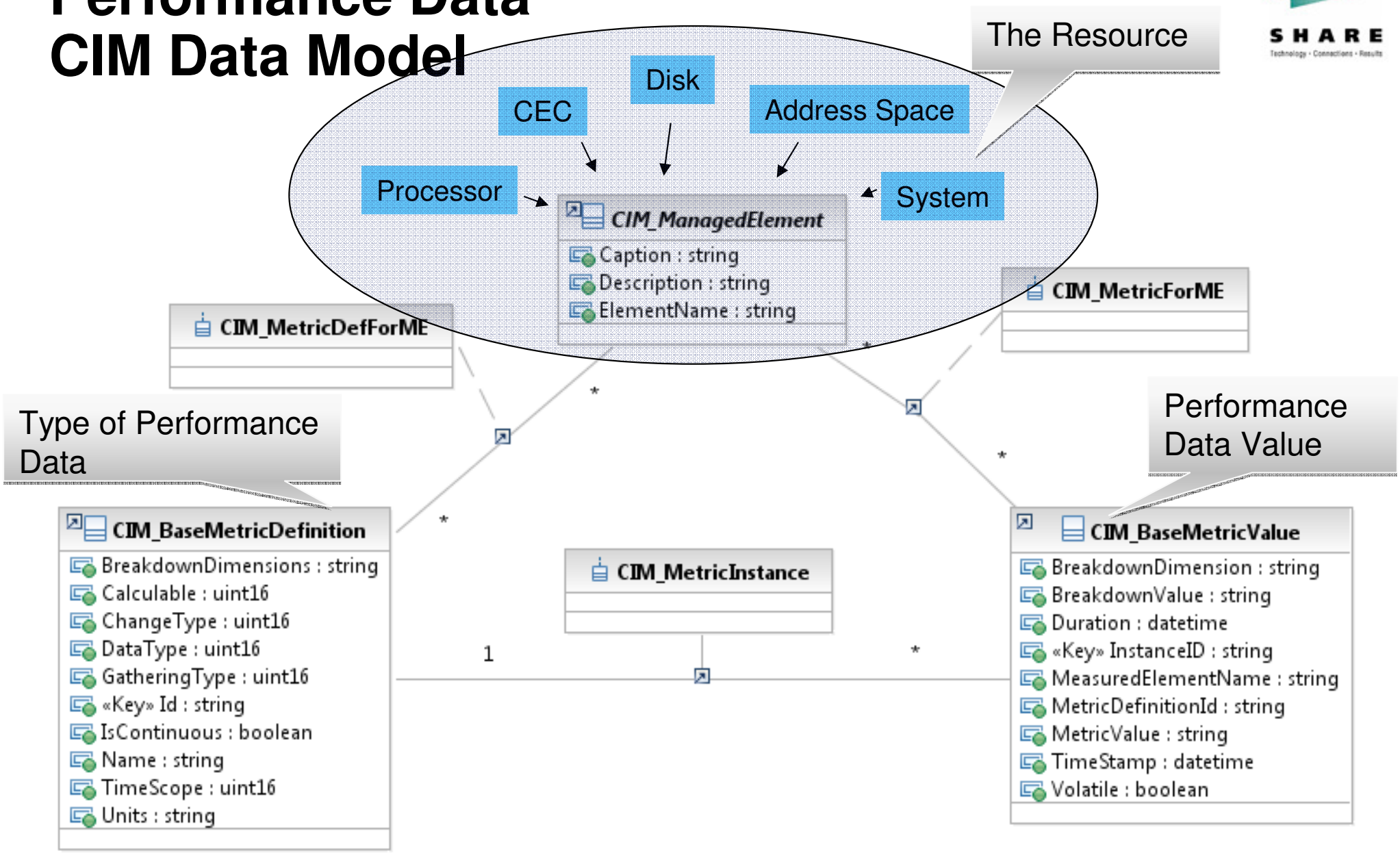
Components of z/OS CIM



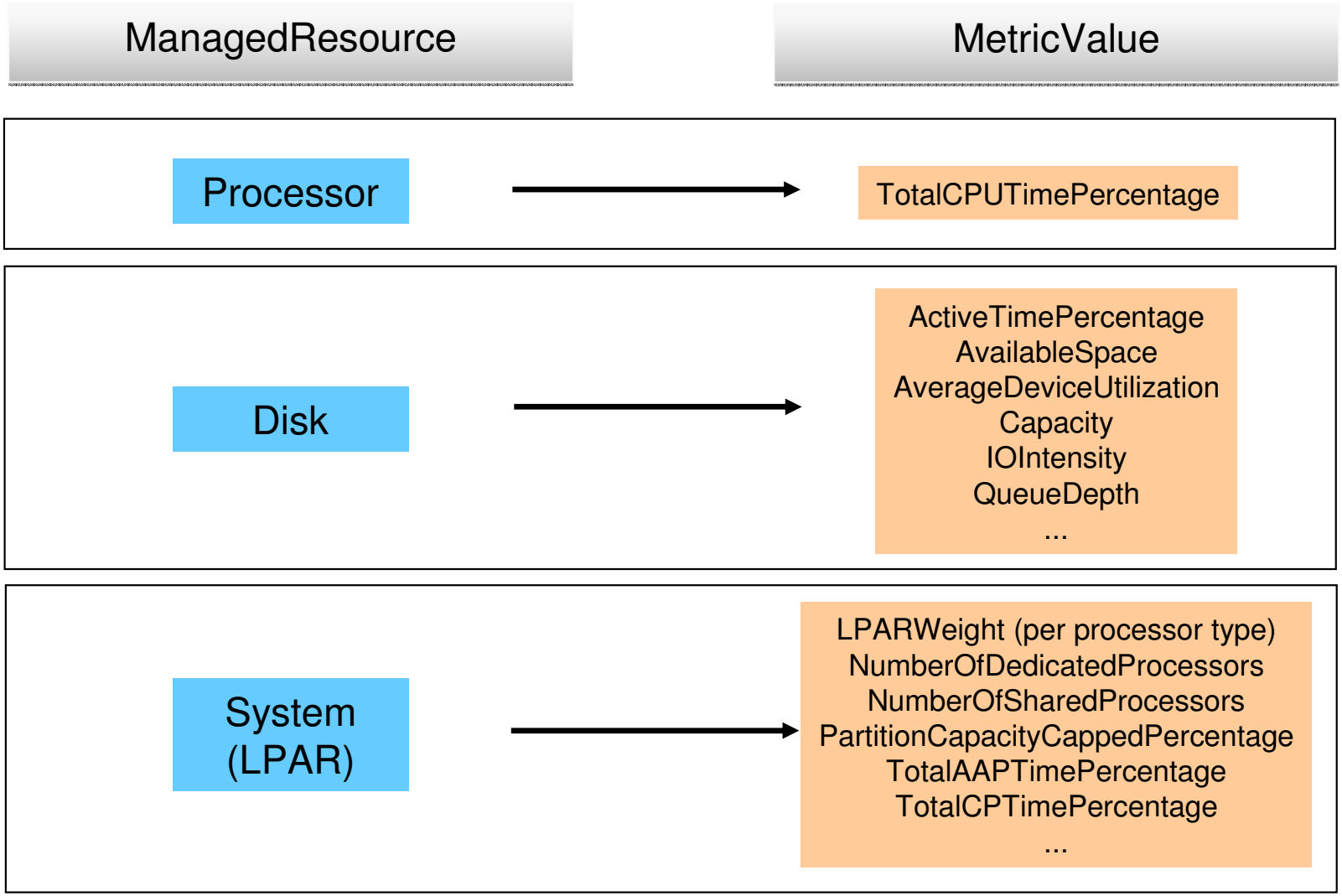
Resource data available through z/OS CIM

See z/OS CIM User's Guide (SC33-7999) for details

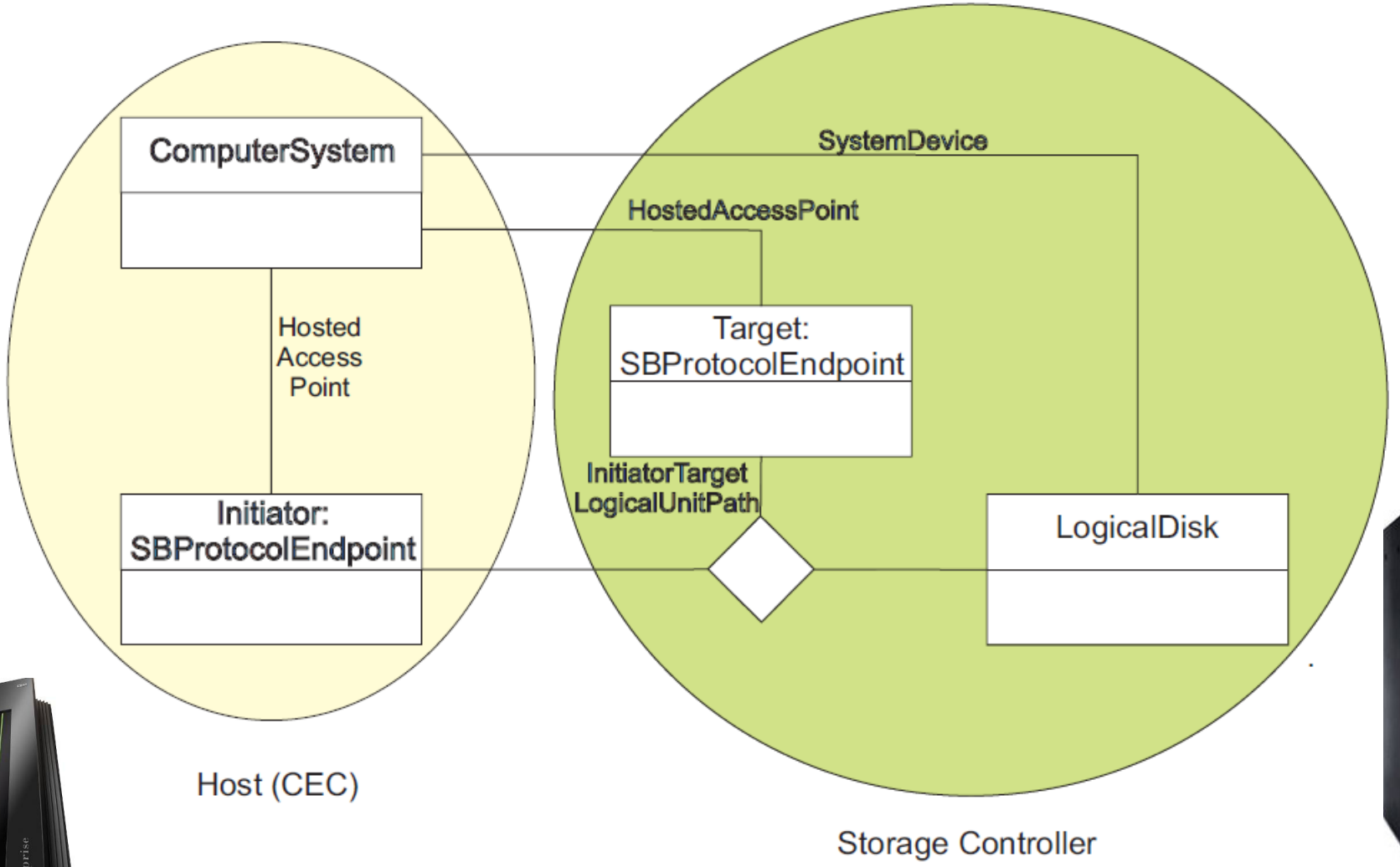
Performance Data CIM Data Model



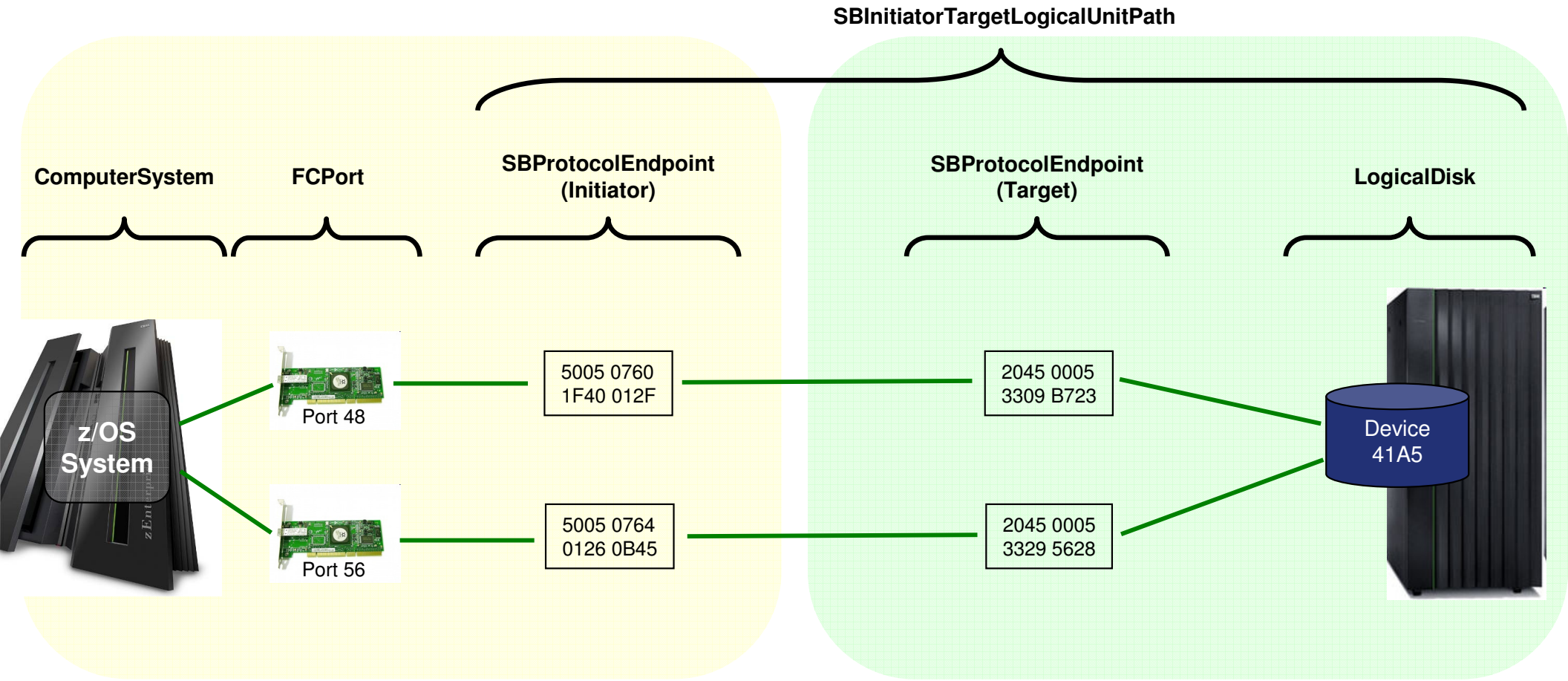
Performance Data Examples



Storage Example
CIM Data Model



Storage Example
Paths to Disks in CIM terms



The way CIM works
By example of examining storage

- List all the FCPorts attached to a z/OS System
  - EnumerateInstances(CIM_FCPort)
- Select an FCPort and retrieve the associated ProtocolEndpoints
  - Associators(ResultClass = CIM_ProtocolEndpoint)
- Select an (initiator) ProtocolEndpoint and retrieve the associated (target) ProtocolEndpoints and LogicalDisks
  - Associators(CIM_InitiatorTargetLogicalUnitPath)

Command Line Example
Listing FCPorts

Requesting a list of FC Ports on the local system through **cimcli**:

```
>> cimcli enumerateinstances cim_fcport
   -pl creationclassname,systemname,portnumber,
       permanentaddress
   -o table
```

```
SystemName                    CreationClassName  PortNumber  PermanentAddress
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      48          500507601F40012F
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      49          5005076401660ABA
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      50          5005076401A60ABA
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      51          5005076401E60ABA
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      52          500507601F4005AF
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      53          5005076401660B32
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      54          50050764012263FE
BOEPEG4.boeblingen.de.ibm.com IBMzOS_FCPort      55          5005076401E60B32
...
```

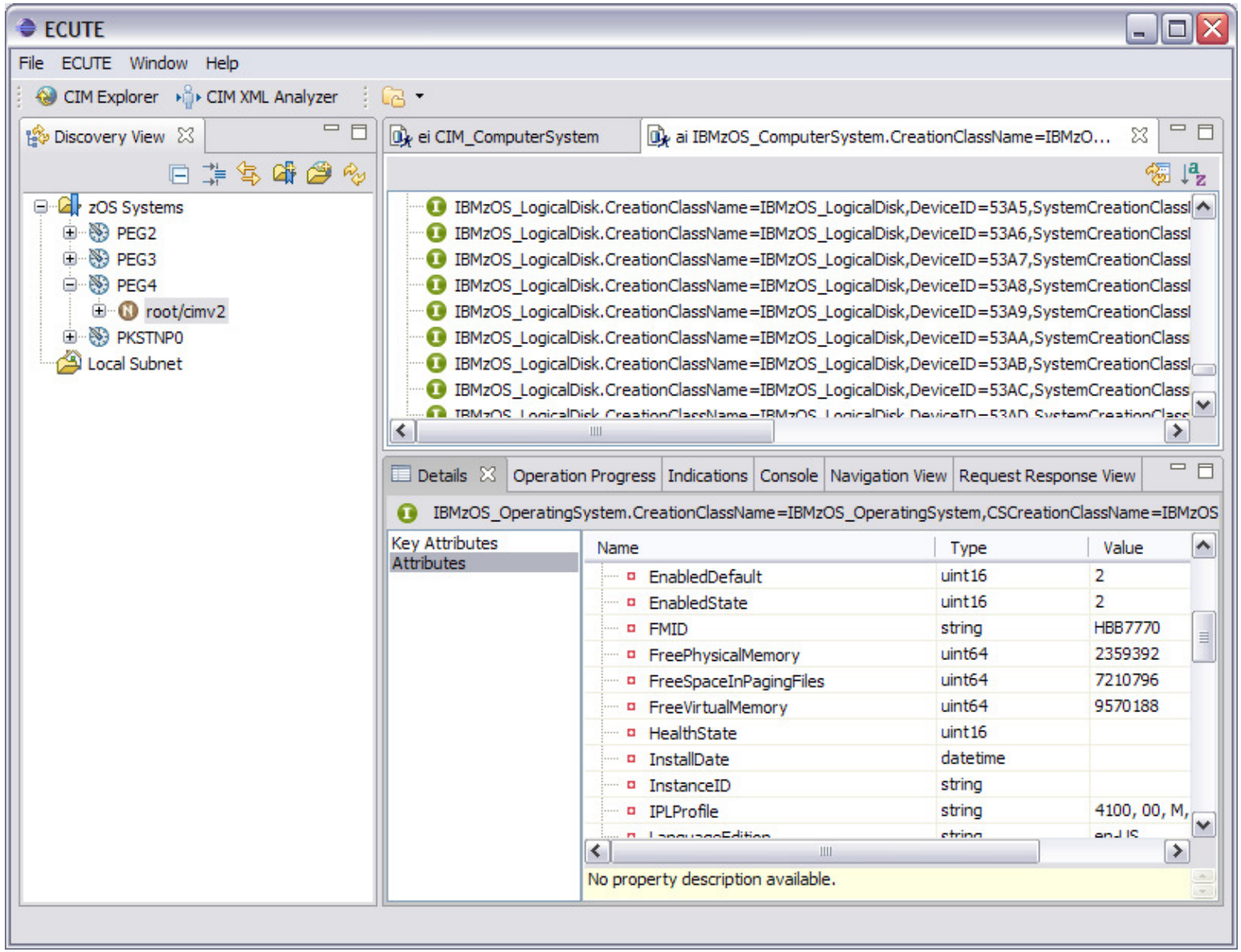
Command Line Example
Retrieving associated elements

Requesting the ProtocolEndpoints connected to a specific FC Port on the local system through **cimcli**:

```
>> cimcli associators cim_fcport -i
   -rc cim_protocolendpoint
   -pl name,role,creationclassname,systemname
```

```
path=
//BOEPEG4/root/cimv2:IBMzOS_SBProtocolEndpoint.CreationClassName="IBMzOS_SBProtocol
Endpoint",Name="500507601F40012F",SystemCreationClassName="IBMzOS_ComputerSystem",S
ystemName="BOEPEG4.boeblingen.de.ibm.com“

instance of IBMzOS_SBProtocolEndpoint
{
  SystemName = "BOEPEG4.boeblingen.de.ibm.com";
  CreationClassName = "IBMzOS_SBProtocolEndpoint";
  Name = "500507601F40012F";
  Role = 2;
};
```

CIM Browser Example – ECUTE CIM Explorer



Available at: http://sourceforge.net/apps/mediawiki/sblim/index.php?title=Ecute

Example – WS Management

New with z/OS R13

- **The Windows Vista / 7 "winrm" command:**
  - A feature of the Microsoft Windows Operating System that can be used to execute CIM requests against the z/OS CIM Server over the WS-Management protocol
  - Windows 7 Example (Run a "Command Prompt" as administrator):
    - Setup:
    - `> winrm quickconfig`
    - `> winrm set winrm/config/client @{AllowUnencrypted="true"}`
    - `> winrm set winrm/config/client/auth @{Basic="true"}`
    - `> winrm set winrm/config/client @{TrustedHosts="<z/OS IP address>"}`
    - EnumerateInstances example:
    - `> winrm enumerate http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_FCPort -username:<user> -r:<z/OS IP address>:5988 -auth:basic -format:#text -encoding:utf-8`

CIM Client API for Java

- The SBLIM CIM Client 2 is a pure Java implementation of …
  - the WBEM Operations API
  - Supports the CIM-XML over HTTP(S) protocol
  - the CIM Meta-Model representation
  - an Indication listener
  - Based on JSR48 Standard
- Located at */usr/lpp/wbem/jclient*
  - Client library *sblim-cim-client2.jar*
    - Configuration file *cim.defaults*
  - API Java DOC *sblim-cim-client2-doc.zip*

- Additional documentation is provided at http://sourceforge.net/apps/mediawiki/sblim/index.php?title=CimClient

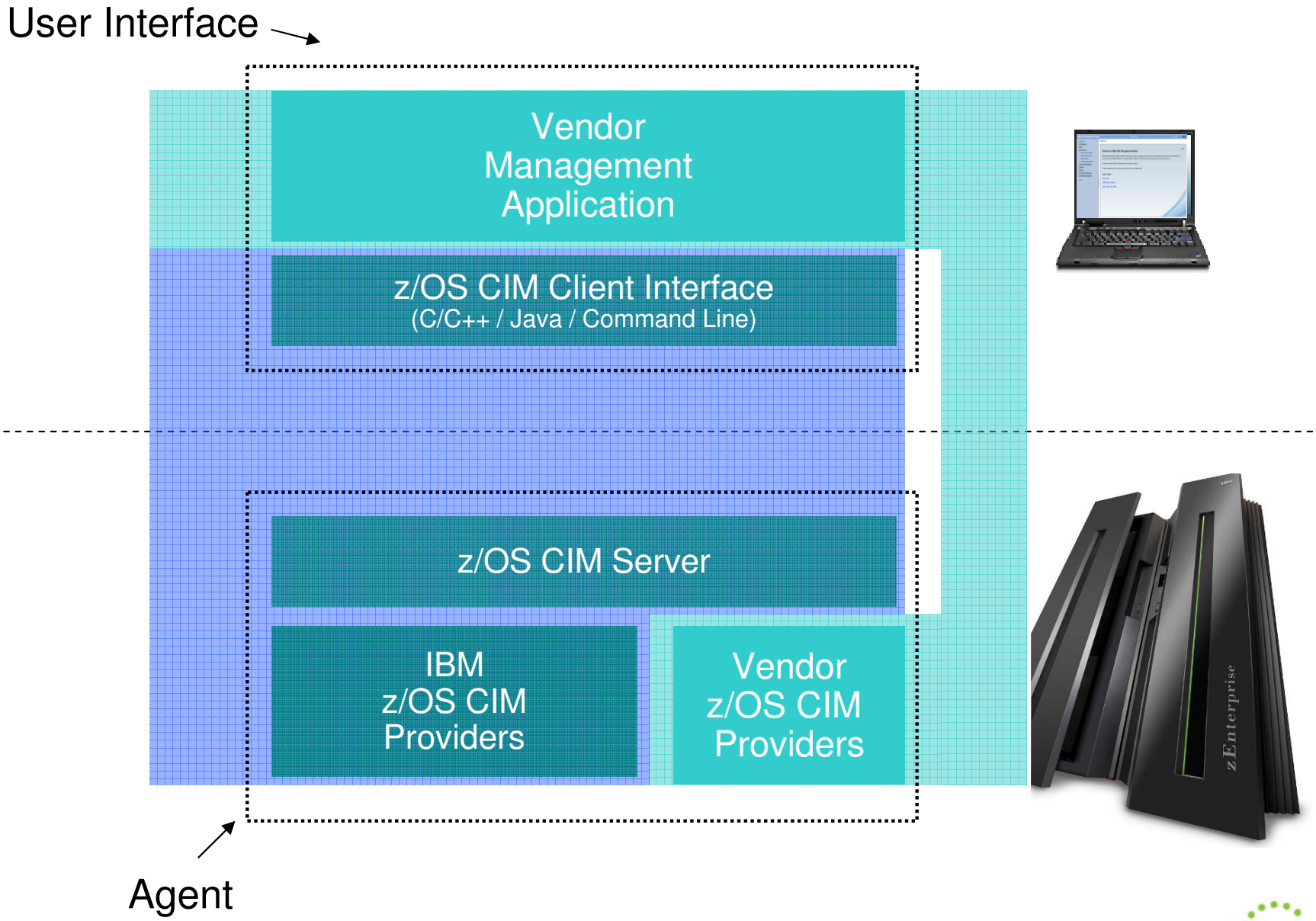
→ Additonal samples in source package of the SBLIM CIM Client 2

→\smpl\org\sblim\cimclient\samples\JSR48*.java

Java CIM Client 2 API Example Listing FCPorts


```
import javax.cim.*;
import javax.wbem.*;
...

UserPrincipal userPr = new UserPrincipal("AUSER");
PasswordCredential pwCred = new PasswordCredential("APASSWORD");

String nameSpace = "http://sys1.acme.com:5988/root/cimv2";
CIMObjectPath serverPath = new CIMObjectPath(nameSpace);

Subject pSubject = new Subject ();
pSubject.getPrincipals().add(userPr);
pSubject.getPrivateCredentials().add(pwCred);

WBEMClient cimClient = WBEMClientFactory.getClient("CIM-XML");
cimClient.initialize(serverPath, pSubject, LocaleFactory.create(language));

CIMObjectPath processPath = new CIMObjectPath("CIM_FCPort", "root/cimv2");

CloseableIterator instances;
instances = cimClient.enumerateInstances(processPath, true, false, false, null);
while(instances.hasNext()){
          CIMInstance cimInstance = (CIMInstance)instances.next();
          System.out.println(cimInstance.toString());
}
instances.close();
...
```

Using the CIM Infrastructure for Management Apps



Further information on CIM/WBEM

- General information about the CIM/WBEM standards
  → http://www.dmtf.org/standards
- DMTF's CIM Tutorial
  → http://www.wbemsolutions.com/tutorials/CIM/
- OpenPegasus CIM Server
  → http://www.openpegasus.org
- Storage Management Initiative Specification (SMI-S)
  → http://www.snia.org/tech_activities/standards/curr_standards/smi
- z/OS CIM Users Guide
  → http://www-03.ibm.com/systems/z/os/zos/bkserv/r13pdf/#cfz99l13.scr