GRID SERVICES

Based on the OGSI specification, a grid service instance is a Web service that conforms to a set of conventions expressed by the WSDL as service interfaces, extensions, and behaviors. A grid service provides the controlled management of the distributed and often long-lived state that is commonly required in sophisticated distributed applications. According to the definition of OGSI, every grid service is a Web service; however, the converse need not be true.

The OGSI specification defines the following:

- How grid service instances are named and referenced
- How the interfaces and behaviors are common to all GRID services
- How to specify additional interfaces, behaviors, and their extensions

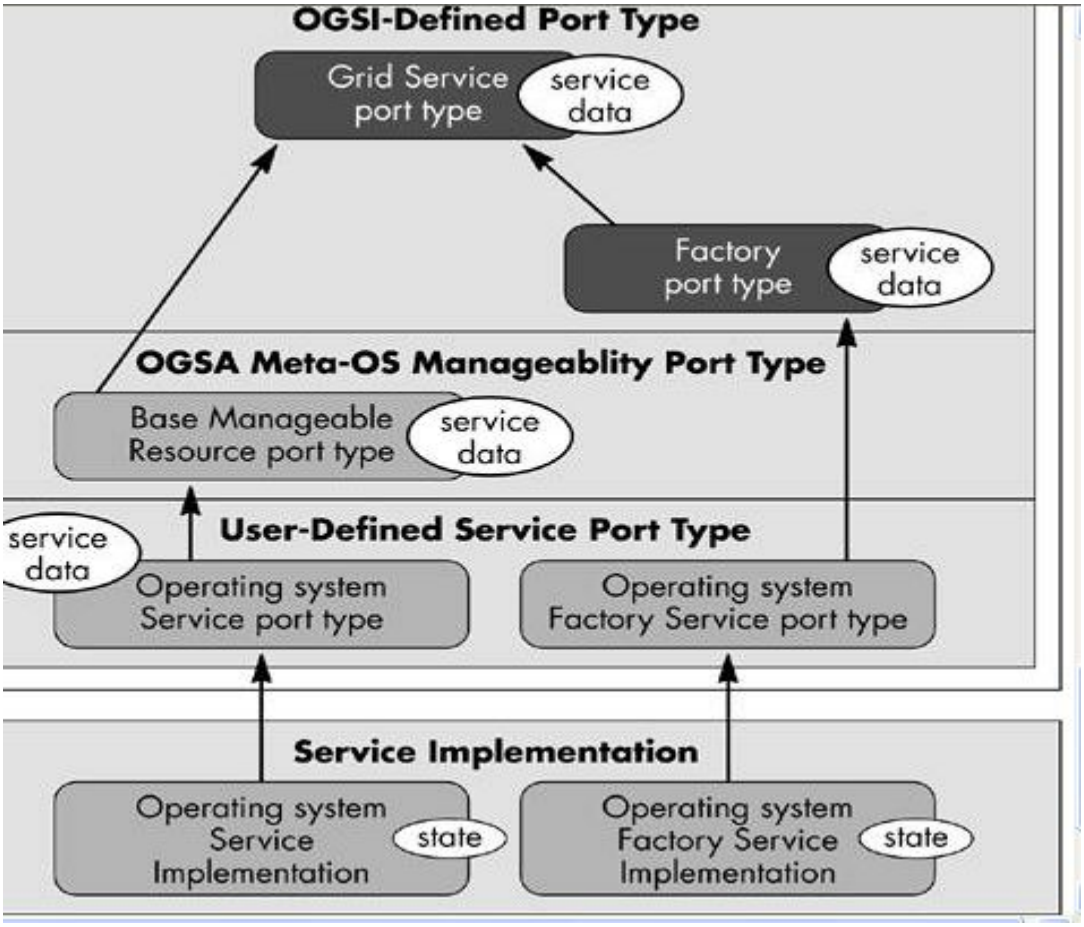
The grid services specification does not address the common service hosting behaviors, including how grid services are created, managed, and destroyed in a hosting environment. Rather, the specification recommends message-level interoperability, whereby any grid service client following the OGSI standard can interact with every grid service hosted by any hosting environment. This message-level interoperability is the core feature of this standard, and it is achieved by using XML as the core message format and schema.

For purposes of this particular discussion, the OGSI, and the concepts introduced by the specification, we will now introduce a sample from the management aspect of grid services, as specified through the Meta-OS service of the Common Management Model. This sample is an operating system resource implementation with its associated factory service implementation. We will be focusing on the OGSI concepts used by this sample service implementation, and not on the manageability features. Since OGSI is layered on top of the Web service standard, familiarity with the core Web service concepts, including XML, XML schema, WSDL, SOAP, and the Web services programming model, (i.e., client and server side) will help us to better understand the OGSI in greater depth. We can find greater details on these technologies in the previous discussion and by visiting their Web sites.

The interface inheritance diagram, as shown in Figure 5.2, introduces the following concepts of a grid service, enabled by:

- Providing a stateful Web service implementation of the operating system service with public interface (OperatingSystem portType) to access the service and its state.
- Supporting interface inheritance. The operating system service implements OperatingSystem portType, which is derived from the BaseManageableResource interface, which in turn extends the GridService interface.
- Specifying the common grid service behaviors (public "state data" and "operations") using GridService portType as defined by the OGSI.
- Allowing the operating system services to inherit the public state data and operations from its parent port types.
- Manipulating the state of a service through the GridService operations such as "findServiceData" and "setServiceData."
- Enabling the client so that it can discover the state and meta-data of the service through "findServiceData" of the GridService interface. We will see the common OGSI-defined service meta-data later in this chapter.
- Establishing a pattern implementation for the operating system service, whereby the factory service inherits from the OGSI factory interface. This is an optional feature and hence may not present itself in the real grid service implementation environments.

Figure 5.2. The OGSI Port Type Inheritance model for operating system service and the operating system factory service sample (the solid arrow indicates the inheritance).



One of the requirements of services defined by the OGSI is the ability to describe the preceding concepts using an OGSI description model, which is a combination of Web service WSDL and OGSI GWSDL. We will see the details in later sections.