What is the "Liberty Profile?"

The new IBM WebSphere Application Server "Liberty Profile" is a significant new approach to application serving. The Liberty Profile is designed to be *composable*, *lightweight*, *dynamic* and *fast*:

Composable -- the function is very modular and flexibly decoupled, allowing you to specify just what function you need for the applications you are serving.

Lightweight -- the Liberty Profile uses a number of approaches to optimize the loading of functions, which results in a footprint significantly less than traditional WebSphere Application Server.

Dynamic -- many of the runtime functions may be dynamically updated by simply changing the configuration XML; applications may be added or updated by simply replacing the application file in the file system directory.

Fast -- due to the composable design and other factors, the Liberty Profile is able to execute very quickly.

The Liberty Profile is provided with WebSphere Application Server Version 8.5. It is configured and operated separately from what is known as the *traditional* WebSphere Application Server model.

Some Questions Answered

Why a new application server model?

Traditional WebSphere Application Server is an very robust runtime environment. It is capable of hosting very sophisticated full-function applications. The Liberty Profile is a *subset* of function, perfect for cases where the application requirements do not call for the full traditional WAS.

What kind of applications may be run?

The Liberty Profile supports web applications.

Traditional WebSphere Application Server is still available?

Yes. Traditional WebSphere Application Server and the new Liberty Profile are provided together. You use either or both according to your business needs.

Is Liberty Profile available on z/OS?

Yes, as well as all other platforms supported by WebSphere Application Server itself.

Does Liberty Profile on z/OS take advantage of z/OS?

Yes, for example: JDBC Type 2 using RRS for transaction support, WLM classification, access to SAF security, as well as operator command support and dump request services.

What does it look like running on z/OS?

A Liberty Profile server instance may be started as a UNIX Systems Services process or as a started task. As a started task a Liberty Profile server instance appears as a single address space[1].

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1   There is another address space called the "Angel process" which provides access to authorized z/OS services. More on that in a bit.

May I have multiple server instances if I need separate servers?

Yes. You may configure and operate as many Liberty Profile server instances as your needs call for.

### How much memory does a Liberty Profile server consume?

The memory consumed by a Liberty Profile server instance is a function of many factors. That said, it is possible to have a Liberty Profile server instance consume as little as 50MB.

I've heard a server starts quickly ... is that true?

Again, the time it takes to start a Liberty Profile server instance is a function of many factors ... but that said, it is possible to see a Liberty Profile server instance start in well under five seconds.

Liberty Profile on z/OS

The following picture illustrates at a high level what the Liberty Profile looks like on z/OS. The numbered blocks correspond to the notes that follow:
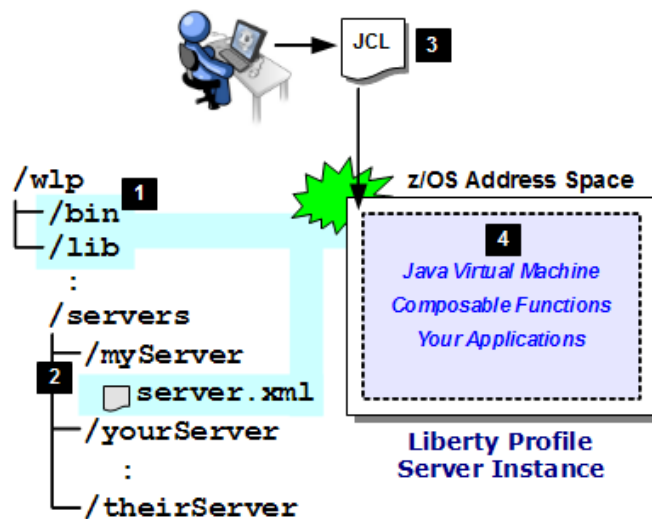
A *somewhat* simplified picture, but the key concepts are represented.

Notes:

1 The Liberty Profile "install" directory, which contains the Java class files and the z/OS native modules.

2 The "user" directory containing the created servers and their configuration files and directories. This may be separate from the install directory. You may have many separate user directories all making use of a common install directory.

3 If you choose to start the Liberty Profile server as a started task, a supplied JCL start procedure is used.

4 The started task as a single address space, with the JVM, the Liberty Profile functions as well as your applications.

Taking Advantage of the z/OS Platform

The Liberty Profile on z/OS has been functionally *extended* to take advantage of specific features of the z/OS platform. In every other way the Liberty Profile on z/OS is just like on other

platforms.

In the V8.5 release the z/OS platform services taken advantage of by Liberty Profile on z/OS are[2]:

JDBC Type 2 and RRS -- IBM DB2 z/OS provides a cross-memory mechanism commonly referred to as a "JDBC Type 2" connector. The advantage of JDBC Type 2 includes: low latency, assertion of identity, single thread of execution, ability to avoid serializing parameters, as well as the use of IBM Resource Recovery Services (RRS) for global transaction synchpoint coordination. JDBC Type 4 (TCP-based) is also supported.

WLM Classification -- This provides the ability to identify work by classification rule and have z/OS Workload Manager (WLM) create an enclave for that work so it becomes associated with a Service Class and Reporting Class of your choosing. This allows WLM to manage work to your goals, as well as giving you the ability to use RMF to report on work with more granularity.

SAF Security -- IBM z/OS Security Access Facility (SAF) is an interface to installed security products such as IBM's RACF or similar products from other vendors. Liberty z/OS was provided the ability to access SAF for authentication as well as digital certificate keystore functions.

Operator Commands -- The z/OS MODIFY command may be used to dynamically change a Liberty Profile server's tracing specification, or to request dynamic TDUMP or SVCDUMP output.

The Liberty Profile z/OS "Angel" Process

The "Angel" process provides an anchor point for access to z/OS *authorized* services.

Here are a few things to understand about the Angel process:

- It is an extremely lightweight process that consumes almost no CPU once started
- It has no configuration file and it consumes no TCP ports
- It is only needed if there are Liberty Profile servers on the z/OS image seeking to use certain z/OS authorized services
- Only one Angel process is needed on the z/OS image regardless of the number of Liberty Profile server instances seeking the Angel's services
- The Angel process is code-level neutral, which means it does *not* need to be at a higher code level than supported servers. And maintenance can be applied *without* taking down the Angel.

Those familiar with the traditional WebSphere Application Server z/OS "Daemon" process will see this "Angel" process is quite different in form and function.

An Example `server.xml` File

The configuration of a Liberty Profile server instance is quite simple. It involves only one required[3] XML file -- `server.xml`

Suppose you wish to deploy a simple servlet into a Liberty Profile server instance. Here is what the `server.xml` file might look like:

```
<server description="myServer">

    <featureManager>
        <feature>servlet-3.0</feature>
    </featureManager>
```

```
    <httpEndpoint
      id="defaultHttpEndpoint"
      host="*" httpPort="9080" />

</server>
```

This provides servlet function for a server that listens on HTTP port 9080. It can be that simple. The `server.xml` defines what functions will be available to the server; Liberty Profile itself determines when to load them and what other supporting functions are required.

If more features are desired you update the <featureManager> section and supply the appropriate supporting XML elements to complete the configuration.

Development? Test? Production?

Any ... or quite possibly each. It has a potential role in all three.

For development and test, the Liberty Profile is compelling because it consumes less resource than traditional WebSphere Application Server z/OS. Directories are monitored for updates and changes are dynamically implemented.

Applications developed and tested in Liberty will run in traditional WebSphere Application Server.

Note: since Liberty is a *subset* of traditional WAS function the reverse may not be the case. For example, an EJB application will run in traditional WAS but not the Liberty Profile.

Here's a picture illustrating one possible production use-case:
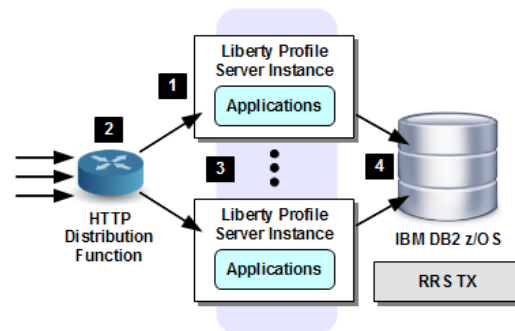
1 Multiple instances of Liberty Profile servers configured
2 Front-end HTTP distribution device employed
3 Liberty Profile supports HTTP session persistence
4 JDBC Type 2 to DB2 with RRS synchpoint coordination

Proper planning and evaluation is always recommended whenever key business processes are involved.

Summary

Liberty Profile and z/OS: a new lightweight, dynamic and fast WebSphere Application Server runtime model combined with IBM's flagship operating system platform. The best of both worlds.

For More Information

Contact your local IBM representative. Also, see **WP102110** at `ibm.com/support/techdocs` for more on WebSphere Application Server for z/OS V8.5 and the Liberty Profile.

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2   Future enhancements potential. All statements regarding IBM future direction or intent are subject to change or withdrawal without notice and represent goals and objectives only.

3   Other *optional* configuration files exist.