



# Installing IBM z Systems Development and Test Environment



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# Installing z Systems Development and Test Environment

Learn how to install the product.

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## z Systems Development and Test Environment prerequisites

Learn about hardware and software requirements for IBM® z Systems™ Development and Test Environment.

For the latest and most up-to-date hardware and software requirements, go to the IBM z Systems Development and Test Environment product page and select the **System Requirements** tab. Hardware and software requirements are also documented in the zPDT Guide and Reference.

### Hardware provisioning

Learn about the hardware systems that can be used for z Systems Development and Test Environment.

#### PC System

A range of personal computer systems and Linux distributions can be used for z Systems Development and Test Environment. These configurations change over time, due to frequent personal computer hardware advances and new Linux releases. As a general statement, zPDT® works with any modern Intel compatible processor that is fully supported by the recommended Linux distributions.

The following sections list the hardware and software requirements to install and run z Systems Development and Test Environment. Ensuring your PC meets these requirements is the first step in installing z Systems Development and Test Environment. These requirements are a sufficient guide for that process, assuming your PC is dedicated to Linux. The zPDT Guide and Reference gives additional information that can be valuable. It lists the PC hardware that was used to test zPDT Version 1 Release 6, gives more detailed guidelines on the hardware and software requirements, and gives some considerations if either your PC is not dedicated to Linux or it runs in a virtual environment. For more information, see section 2.4, “Base configurations” and chapter 5, “zPDT installation” in the *zPDT Guide and Reference*.

#### USB Hardware Device

A USB hardware device is required for z Systems Development and Test Environment Personal Edition and releases before v10.0.

When licensing by using a USB hardware device, z Systems Development and Test Environment requires access to a USB hardware device that is activated with a license key called an update file. The USB hardware device is ordered through Passport Advantage® in a media pack that is separate from the electronic media that contains the offering software. It can be connected directly to the USB port on a computer that is hosting the offering or it can be plugged in to the USB port of a separate computer, that is called a Sentinel Hardware Keys (SHK) license server and hosts the offering for distributing authentication to remote instances of the product through a TCP/IP network. Ideally, the USB hardware device is ordered at

the same time as z Systems Development and Test Environment, or you are already running a separate computer that is acting as a license server. If neither is the case, you must order "IBM Rational® Development and Test Environment for z Systems Version 10.0 USB Hardware Device" through Passport Advantage.

Even in its simplest environment, which is a single USB hardware device that is connecting to a single PC that hosts z Systems Development and Test Environment, you must consider several issues. USB hardware devices must be activated. Depending on the type of license, the USB hardware device or a license manager must be activated with the number of CPs needed for all instances that use that device. The license key files have expiration dates, and they can interact with Rational tokens. In more complex environments, license servers can be activated. For an in-depth explanation of software-based licensing and USB hardware device planning, acquisition, and activation, see Enabling product operation.

## Hardware requirements

Learn about the hardware platforms that are supported by z Systems Development and Test Environment.

### **z Systems Development and Test Environment instance**

#### **Hardware platforms that are supported:**

- 64-bit x86 Intel or compatible servers
- zEnterprise® BladeCenter Extension Model 003 hardware and above (zBX version 3)

#### **Minimum processor rating:**

- As a general statement, zPDT works with any modern Intel processor that is fully supported by the recommended Linux distributions

#### **Processor core requirement:**

- The hardware or virtual machine system must have at least 1 more PC core than the total number of z Systems CPs for all concurrently running zPDT instances. The number of z Systems CPs allowed for each instance is defined in the processor statement of the device map for each instance, requiring a minimum of 1 CP and a maximum of 8 CPs. For an example of the processor statement, see Defining the device map.
- For standard installations, the following configuration is recommended: a 4-Core system with one core that is devoted to Linux and three cores that are devoted to z/OS®.
- For Sysplex installations, use this configuration: an 11-Core system with three cores that are devoted to Linux and eight cores that are devoted to z/VM® and its guests.

#### **Memory requirement:**

- You need PC memory of *at least* 1 GB larger than the intended size of the emulated z Systems memory for ALL the concurrently running zPDT instances. The size of the z Systems memory to be used for zPDT operation is defined in the memory statement of the device map for each instance. 2 GB is a bare minimum for z Systems memory. 2 GB to 4 GB per emulated CP is a more realistic starting point.
- For the sysplex capability, because extra memory is required for z/VM, the coupling facility, and multiple z/OS guests, a minimum of 16 GB is needed.

Because z Systems Development and Test Environment reserves the full amount of physical memory that is assigned to the virtual z Systems machine, ensure that you have at least as much physical memory as your virtual z Systems machine requires, plus 1 GB for Linux.

**Removable media requirements:**

- If you are not using a product license server or a license manager, a suitable USB port must be available for the 1091 hardware key. Do not use an unpowered USB port expander when you are using zPDT. In particular, do not install the USB Hardware Device in an unpowered USB port expander. (The product license server, sometimes called a product license server, is described in zPDT license servers, and provides an alternative way to manage the device.)

**Hard disk requirements:**

50 GB to 100 GB of disk space is required for z/OS. The minimum required available disk space is twice the total required memory that is defined for the server instance. If you are using the sysplex capability, an extra 54 GB of disk space is required to hold the z/VM software distribution. Depending on how much software you load into each z/OS system that is running in a parallel sysplex configuration, you might need up to 220 GB per z/OS system.

**Other hardware requirements:**

- For information about zBX systems and the hardware specifications of Model 003 and above, see the IBM z<sup>™</sup> BladeCenter Extension product page.
- Disable Hyper-threading (if available) at the BIOS level. Hyper-threading can produce extreme slowdowns when z/OS is running spinloops. If many PC cores are available the slowdowns might be resolved before z/OS console messages are produced, indicating no problem other than reduced performance.

**Product license server or license manager**

When you activate the product with a USB hardware device, one option for making the license key files available to the program is to set up a remote license server and use network communications to enable independent installations of z Systems Development and Test Environment to be authenticated by a single server. Otherwise, each machine that is hosting z Systems Development and Test Environment requires a hardware device to be installed locally to make it available to the program.

Setting up a product license server to authenticate with a high capacity USB hardware device involves installing z Systems Development and Test Environment on a platform and installing a license key file, which is also called an update file, on a USB hardware device on the license server. The product license server must then be started and the clients must be configured to access it. For more information, see Quick setup instructions for using and migrating the product license server.

With software-based licensing, you can authenticate without a USB hardware device. Setting up a license manager to authenticate software-based licenses involves installing the z Systems Development and Test Environment license manager on a platform, starting the license manager, and installing a license key file on the license manager to activate it. The clients that use the license manager

must then be configured to access it, and the license manager client function must be started. For more information, see Software-based licensing.

The systems that host the product license server or the license manager have a different set of requirements.

**Hardware platforms that are supported:**

- 64-bit x86 Intel or compatible servers

**Minimum processor rating:**

- 2.0 GHz or higher Intel Core 2 Duo, Generation 1 Intel i3, or equivalent processor required

**Memory requirement:**

- 2 GB of RAM is required.

**Hard disk requirements:**

- 12 GB of disk space is required for Linux and workspace.

**Removable media requirements:**

- If you are using a product license server, a suitable USB port must be available for the 1091 hardware key. Do not use an unpowered USB port expander when you are using zPDT. In particular, do not install the USB Hardware Device in an unpowered USB port expander. (The product license server, sometimes called a product license server, is described in zPDT license servers, and provides an alternative way to manage the device.)

## Software requirements

Learn about software requirements for z Systems Development and Test Environment

### z Systems Development and Test Environment instance

With z Systems Development and Test Environment, you can install the product directly on the operating system that is running on a supported hardware platform (native installations), or you can install the product on a supported operating system that is running in a supported virtualization environment (virtual installations). These operating systems and platforms are required:

**Operating System requirements for native installations:**

- Red Hat Enterprise Linux (RHEL) 6.0 or later minor release
- Red Hat Enterprise Linux (RHEL) 7.0 or later minor release

**Operating System platforms that are supported for virtual installations:**

- Red Hat Enterprise Linux (RHEL) 6.0 or later minor release
- Red Hat Enterprise Linux (RHEL) 7.0 or later minor release
- The zBX Model 003 and above integrated software and hardware system, running RHEL 6.0 or later minor release
- The zBX Model 003 and above integrated software and hardware system, running RHEL 7.0 or later minor release

You can run on later releases within each version. The recommended Linux version is RHEL 7.0. If problems are encountered, support for releases within the supported version is provided.

**Virtualization Technologies supported:**



- VMWare ESXi 5.1
- zBX model 3 and above
- Support for KVM kernel modules
- Support for XEN hypervisor.

VMWare ESXi 5.1 must be run on 64-bit Intel compatible hardware.

Directly attached SCSI tape drives are not supported by z Systems Development and Test Environment within any virtualized environment.

When you are running z Systems Development and Test Environment in a virtual environment, you must have sufficient physical memory and processor cores to completely provision each instance of z Systems Development and Test Environment.

- For each instance of z Systems Development and Test Environment, the machine that is running your virtualization software must have one physical core for each CP in the instance, plus one physical core for Linux.
- Physical memory on the machine that is running the virtualization software must be sufficient to contain the total memory of all z Systems Development and Test Environment instances.
- Processors and memory that is used for virtual machines that are running z Systems Development and Test Environment are considered dedicated to z Systems Development and Test Environment. Careful planning must be done if other virtual machines are to run on the same hardware.
- Failure to provide sufficient physical processors and memory, or the over-commitment of memory or processor cores, might lead to severe performance problems and might cause unpredictable errors, or errors that are difficult to diagnose.

## **Product license server or license manager**

### **Operating System requirements:**

- Red Hat Enterprise Linux (RHEL) 6.0 or later minor release
- Red Hat Enterprise Linux (RHEL) 7.0 or later minor release

### **Virtualization Technologies supported:**

- VMWare ESXi 5.1
- Support for KVM kernel modules (packaged with supported levels of RHEL)

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## **Configuring the base Linux system**

Install a supported Linux distribution, including the 32-bit runtimes.

To configure Linux to install and run z Systems Development and Test Environment:

- Disk Planning
  - Create at least three partitions for the hard disk drive:
    - One for the root partition, containing all the normal root directories such as /usr, /lib, /home, /etc. Make this partition 10 - 20 GB.
    - One for a swap partition for Linux. Make this partition 4 GB or larger.

- A large partition for emulated z Systems volumes and any other user data.

This suggested disk layout usage is not required. It is a starting point solely because it is simple and it isolates emulated z Systems volumes from the normal Linux files. This isolation is useful if you reinstall Linux (without disturbing your emulated volumes) and it might have minor performance benefits because it tends to reduce fragmentation in the disk space that is used for large emulated volumes.

Disk images for z/OS can be on any partition with sufficient space. When you install Linux, a separate partition for user data, including disk images, is needed so that data is not lost during Linux system maintenance or upgrades. Disk space requirements depend on the number of z/OS volumes you use. If most of your z/OS volumes are 3390-3 images, a minimum amount of disk space that is required by the Development and Test Environment operation can be approximated by the calculation

$(3 \text{ GB} \times (\text{number of volumes})) + (2 \times (\text{memory in your z/OS machine}))$

These examples assume that you are running z Systems Development and Test Environment under the user ID of `ibmsys1`.

Most of the z Systems Development and Test Environment related files that are mentioned in the customization scenario are stored within the `ibmsys1` home directory. The scripts are in `/home/ibmsys1/z`, and the virtual 3390 volumes are stored in `/home/ibmsys1/z1090/disks`. The directory structure `home/ibmsys1/z1090/disks` was used because that directory structure complies with the structure created when you start the z Systems Development and Test Environment. The hardware clock was set to use Coordinated Universal Time (UTC) because that is required by the USB hardware device. The Linux user ID that was used is `ibmsys1`.

- Important:** You must include Linux 32-bit support, which is an option during Linux installation. Before you install z Systems Development and Test Environment, you must ensure that the 32-bit runtime libraries in Linux are installed. These runtime libraries can be installed as part of the installation of Linux or can be added later by installing the `libstdc++ 32-bit` package for your Linux distribution. Currently, Red Hat distributions do not install the 32-bit libraries during a default installation.

Use the Linux command `rpm -qa | grep libstdc` to verify the 32-bit runtime library installation. If you see rpms with the name `libstdc` in formats similar to the following, then 32-bit runtime libraries are installed. Formats vary based on operating system.

```
libstdc++xx-32bit
libstdc++xx-*32bit
libstdc++-xx-xx.i686.rpm
libstdc++*.i686.rpm
```

After you finish installing z Systems Development and Test Environment, one of the final steps is to run the `z1090instcheck` command. This command verifies the proper Linux 32-bit runtime libraries are installed.
- If you are using software-based licensing, the license manager and the license manager client function also require a 32-bit version of the Linux glibc libraries. Before you install the license manager or start the license manager client on an instance of z Systems Development and Test Environment, you must ensure that the 32-bit versions of the Linux glibc libraries are installed.

These glibc libraries can be installed as part of the installation of Linux or can be added later by installing the `glibc-32bit` package for your Linux distribution. Currently, Red Hat distributions do not install the 32-bit libraries during a default installation.

Use the Linux command `rpm -qa | grep glibc-32bit` to verify the 32-bit glibc library installation. If you see rpms with the name `glibc` in formats similar to the following, then the 32-bit glibc library is installed. Formats vary according to operating system and level.

```
Glibc.i686
Glibc-32bit
```

- System Time**

Set your hardware clock to UTC time to avoid problems when Daylight Saving Time starts and stops. The USB Hardware Device is sensitive to the hardware clock time and does not operate if the time appears to move backward. If the machine is shared with another operating system that expects local time (instead of UTC time), you might experience a one-hour non-operational time when you shift from Daylight Saving Time to standard time.
- Install a TN3270e client for the MVS™ console**

The following TN3270e clients are examples of clients that can be used with the recent zPDT offerings:

  - x3270 (recent versions)
  - Recent Personal Communications releases (running on Windows systems)

The most commonly used TN3270e client is x3270 running on the native Linux host. This client is used in the sample start script for z Systems Development and Test Environment. Frequently, it is not included with Linux distributions. An x3270 package is usually a single rpm, such as:

```
x3270-3.2.20-467.1.x86_64.rpm
```

**Note:** Other x3270 levels can be used or another 3270 emulator can be used for the MVS console. Also, 3270 emulators can be used for the MVS console that are installed remotely, and remove the need to have a 3270 emulator on the native

Linux. For more information, see IPLing z Systems Development and Test Environment from a remote emulated terminal for the system console.

- Firewall considerations

You must manage whatever firewall and other security functions that you install with your Linux. Initially disabling any firewall when first working with zPDT simplifies configuration and operation. After you are familiar with zPDT operation, you can reestablish the firewall functions. If you have external TCP/IP connections (for example, local 3270 connections, OSA connections, product license server or license manager connections, or CTC connections) you must provide appropriate port *holes* in any firewall you use.

Paragraph 13.15, “TCP/UDP ports” in the zPDT Guide and Reference, describes the ports that are used for normal zPDT operations. Port 1947 is also used by the license manager, and must be allowed through the firewall. If your firewall is based on iptables (as is common for most current Linux releases), commands such as those shown in the following example might be used. This example is for setting a rule to allow any emulated local 3270 session traffic through the firewall, and then displaying the rules for the filter table afterward

```
$ su (switch to root)
# iptables -I INPUT -p tcp --dport 3270 -j ACCEPT
# iptables -L -n
# exit (leave root)
```

These commands would need to be entered from a *root* user ID each time the server Linux system is started, and you want to pursue some form of automation for entering these commands. Depending on how you connect z/OS to the external network, you might also need to provide appropriate port *holes* in your firewall to allow traffic to access z/OS ports, or you might need to use Network Address Translation functions in your firewall for this traffic.

The customizations described in this Guide eliminate the need to modify your firewall for z/OS ports. For more information, see Setting up TCP/IP.

For more considerations for Linux installation and configuration, see chapter 5.2, “Linux installation” in the zPDT Guide and Reference.

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## Uninstalling a previous version of z Systems Development and Test Environment

If migrating from Rational Development and Test Environment version 9.1 or earlier, you must uninstall any previously installed version of the product before you install z Systems Development and Test Environment version 10.0.

For information about uninstalling the license manager, see Stopping and uninstalling the license manager.

Use these steps for uninstalling any supported version.

Version 9.0 or above	<ul style="list-style-type: none"> <li>• Stop any currently active instance of z Systems Development and Test Environment. <ul style="list-style-type: none"> <li>– To stop a base instance of z Systems Development and Test Environment, see Starting and stopping z Systems Development and Test Environment.</li> <li>– To stop a license manager, see Stopping and uninstalling the license manager.</li> <li>– If you are running a product license server: <ol style="list-style-type: none"> <li>1. Enter the <b>uimserverstop</b> command from the user ID that started the UIM server on the product license server. Do not enter this command as root.</li> <li>2. Enter these two commands to stop the product license server: <pre># cd /opt/safenet_sentinel/common_files/sentinel # ./loadserv stop</pre> </li> </ol> </li> </ul> </li> <li>• Start Installation Manager</li> <li>• Select <b>Uninstall</b></li> <li>• Select the Installation package for Rational Development and Test Environment for z Systems</li> <li>• Select <b>Uninstall</b></li> </ul>
Version 8.5	<ul style="list-style-type: none"> <li>• Stop any currently active instance of Rational Development and Test Environment for z Systems</li> <li>• From a Linux console that is running as root, go to the directory that contains Rational Developer for z Systems Unit Test. The default installation directory is /tmp/IBM Rational Development and Test Environment for z Systems V8.5.x where <i>x</i> is the version that is installed.</li> <li>• Go to the subdirectory entitled Uninstall_IBM Rational Development and Test Environment for z Systems V8.5.x</li> <li>• Run the command <code>./'Uninstall IBM Rational Development and Test Environment for z Systems V8.5.x'</code> This command starts an InstallAnywhere uninstall wizard.</li> <li>• When the wizard finishes, you see the message "All items were successfully uninstalled"</li> </ul>

Version 8.0	<ul style="list-style-type: none"> <li>• Stop any currently active instance of Rational Development and Test Environment for z Systems</li> <li>• From a Linux console that is running as root, go to the directory that contains Rational Developer for z Unit Test. The default installation directory is /tmp/Rational Developer for z Unit Test V8.0.x where x is the version that is installed.</li> <li>• Go to the subdirectory entitled Uninstall_Rational Developer for z Unit Test V8.0.x</li> <li>• Run the command ./"Uninstall_Rational Developer for z Unit Test V8.0.x". This command starts an InstallAnywhere uninstall wizard</li> <li>• When prompted, select to do a complete uninstall</li> <li>• When the wizard finishes, you see the message "All items were successfully uninstalled"</li> </ul>
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Uninstalling a version of z Systems Development and Test Environment and then reinstalling a newer version does not affect any previously installed z/OS distribution. In other words, any existing z/OS distribution that runs with one level of z Systems Development and Test Environment runs with a newer version, without requiring any form of reinstallation of the z/OS volumes. The z/OS volumes store all of the customizations and data from the last time the distribution was run. The DEVMAP developed for running with that z/OS distribution on the older version runs unchanged with the newer version. For more information, see Defining the device map.

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## Running the installation programs

The Installation e-image for the z Systems Development and Test Environment product is an ISO image that includes two installation programs that you can use to install the product. The program `install.sh` is used to install the product from within a graphical user interface. The program `install-console.sh` is used to install the product in text mode from a Linux console. While the installation programs install the zPDT system, they do not install a z/OS distribution. A z/OS distribution must either be migrated from a current z/OS system or an existing z/OS system that is running on z Systems Development and Test Environment, or be downloaded from Passport Advantage and installed separately.

To run the installation programs, you must first mount the installation ISO image. Mounting .iso images is a manual process that uses the **mount -o loop** command. For example,

```
mount -o loop /path to iso/ZDT10-install-xxxxxxx-yyyyyyy.iso /path to mount on
```

**Note:** Alternatively, you can burn a physical DVD from the .iso image, and insert the DVD into the host machine that is running Linux. Most Linux installations automatically mount a DVD when it is inserted. The term *installation disk* represents either a mounted ISO image or a mounted physical DVD.

The installation programs must be run from the root user ID.

## Installing the product from a graphical user interface

Learn how to use the IBM Installation Manager graphical user interface to install the product.

The procedure for running a graphical program as root from a standard user ID differs for each windowing environment. Generally, if you are running under KDE, prefix the `install.sh` command with `kdesu`, and if you are running under GNOME prefix the command with `gnomesu`.

To install z Systems Development and Test Environment in a graphical user interface environment, run the `install.sh` program. From a command line that is running as root, you can run the program as follows:

```
cd /path to mounted iso
./install.sh
```

Select to install z Systems Development and Test Environment. This command starts the IBM Installation Manager in a window. If the IBM Installation Manager is not already installed, or if it needs to be upgraded, you are guided through the installation or upgrade of the IBM Installation Manager. Read and accept the license, and if you want, change the location of the shared resources for the IBM Installation Manager. You must run IBM Installation Manager as an administrator to install z Systems Development and Test Environment.

After the IBM Installation Manager is installed, perform one of the following two actions:

- Install when no instance of Rational Development and Test Environment is installed.
- Update when Rational Development and Test Environment V9.5 or V10.0 is installed.

### Install when no instance currently installed

1. Click **Install**.
2. Install packages: Select the packages that you want to install and click **Next**. z Systems Development and Test Environment v10.0 offers one package that you can install.
3. Licenses: Read and accept the license. One acceptance of the license applies to all products selected.
4. Location: A default location is supplied for the shared resources directory, and for each product you select. You can change the shared resources directory, and you can also click each product to change its installation location.
  - Note the location of the documentation and sample files for later reference. This location can be updated. The default location for z Systems Development and Test Environment is `/opt/IBM/IBM z Systems Development and Test Environment`.
  - The z Systems Development and Test Environment program files and configuration files are always in `/usr/z1090` and `/opt/safenet_sentinel`.
5. Package Group: Select the package group that you want to install, and click **Next**. z Systems Development and Test Environment v10.0 offers only one package group.
6. Translations: Select the translations that you want and click **Next**.

7. Features: z Systems Development and Test Environment offers two features that you can install.
  - The base IBM z Systems Development and Test Environment runs with a z/OS distribution, and includes the zPDT. Install this feature on computers that host the mainframe applications that run with the emulator, and on a platform that hosts a product license server.
  - The License Manager for IBM z Systems Development and Test Environment feature enables you to run a license manager that manages license key files without the need for a USB hardware device. For more information about using a license manager, see Software-based licensing.

Only one feature can be installed on any one Linux platform. Select one of these features, and then click **Next**.
8. Summary: Displays an overview of the selections that you made and prompts you to run the installation. Click **Install**.

### **Update when Rational Development and Test Environment V9.5 or V10.0 is installed**

If Rational Development and Test Environment V9.5 or z Systems Development and Test Environment V10.0 is currently installed, you can uninstall it and perform an "Install when no instance of Rational Development and Test Environment is installed. Optionally, you can leave it installed and perform an Update. Click the Update button, and you will be guided through the update process for z Systems Development and Test Environment. In this case, the new version replaces the old version in the same location as the currently installed version. Translation features can be modified after the update completes.

The update process guides you through five steps:

1. Update Packages: Select the package that you want to update, and click Next. This will be Rational Development and Test Environment for z Systems or z Systems Development and Test Environment.
2. Updates: Select the updates you want to perform, and click Next. The update will be for z Systems Development and Test Environment Version 10.0.1.
3. Licenses: Read and accept the license. One acceptance of the license applies to all products selected.
4. Features: Each product has its own set of features that can be selected during update. Some are common, such as translation, and some are product unique. z Systems Development and Test Environment offers two features that you can install. The base z Systems Development and Test Environment is the feature that allows you to run with a z/OS distribution, and includes the zPDT. The License Manager feature allows you to run a software-based license server that manages license keys without the need for a USB hardware device. Only one feature can be installed on any one Linux platform. For more information on using a license manager, see Software-based licensing.

Select either the z Systems Development and Test Environment or the z Systems Development and Test Environment License Manager and click Next.
5. Summary: Presents an overview of all selections, and a prompt to run the Update itself. Click on Update to perform the update.

## **Installing the product from a Linux console**

Learn how to install the product from a Linux console.



To install z Systems Development and Test Environment from a Linux console without the graphical user interface, run the `install-console.sh` program. This program starts the IBM Installation Manager in text mode. Read and accept the license. Select the product to install and proceed through the subsequent prompts to install. Follow the instructions within the installation program, similar to the instructions listed for the graphical user interface environment. During the installation, you can change the location where the documentation and samples are and choose the features that you want.

## Silently installing z Systems Development and Test Environment

When a user interface is not available on the Linux image that runs z Systems Development and Test Environment, you can silently install both IBM Installation Manager and z Systems Development and Test Environment.

In this scenario, you must use response files to provide the necessary inputs for installation. The z Systems Development and Test Environment installation disk provides the response files necessary to silently install both Installation Manager and the z Systems Development and Test Environment product.

**Note:** For more information about installing both IBM Installation Manager and other products silently, see *Working in silent mode*.

Two options for completing a silent installation are described. After you install Installation Manager and z Systems Development and Test Environment with either option, if the Linux image has no user interface, you must also administer z Systems Development and Test Environment remotely; that is, you must use an emulated console on a remote system as the system console when you IPL the system. For more information, see *IPLing z Systems Development and Test Environment from a remote emulated terminal for the system console*.

### Option 1: Installing Installation Manager silently and then using Installation Manager to silently install z Systems Development and Test Environment

All steps assume that you are user root, installing as an Administrator, and that you uninstalled any previous instances of Rational Development and Test Environment for z Systems.

If you want to install Installation Manager in a different location from a previously installed Installation Manager, see *Working in silent mode*.

To silently install IBM Installation Manager, do these steps:

1. Use the `su` command to switch to user root.
2. Mount the z Systems Development and Test Environment installation disk.
3. View the license text for Installation Manager in file `license_xx.txt`, where `xx` is your language of preference. You can find this file in the `InstallerImage_linux.gtk.x86_64/license` folder on the installation disk.
4. Use the `cd` command to change to the folder `InstallerImage_linux.gtk.x86_64` on the z Systems Development and Test Environment installation disk.
5. Enter the following command to install Installation Manager:  
`./installc -log Absolute_Path/log_file -acceptLicense`

**Note:** This installation procedure updates any previously installed version of Installation Manager with the required version.

This step completes the installation of IBM Installation Manager. Continue with the following steps to silently install z Systems Development and Test Environment.

6. Use the cp command to copy the zdt1001\_response\_file.xml file from the SilentInstall folder on the z Systems Development and Test Environment installation disk to a location where you can edit the file.
7. Open the response file in an editor and modify the <repository location='..' /> line as follows:  

```
<repository location='/absolute path to installation disk/disk1' />
```
8. If silently installing the license manager, locate the existing offering statement in the response file that starts as follows:  

```
<offering id='com.ibm.rational.development.test.environment.systemz ...
```

Change the **features='main.feature'** parameter to **features='licenseserver.feature'**.

9. Save the updated response file.
10. Use the cd .. command to get back to the z Systems Development and Test Environment installation disk.
11. View the license text for z Systems Development and Test Environment in file xx.html, where xx is your language of preference. You can find this file in the license directory of the installation disk.
12. Enter the following command:  

```
/opt/IBM/InstallationManager/eclipse/tools/imcl input /absolute  
path to modified response file/zdt1001_response_file.xml  
-log log_file -acceptLicense
```

## Option 2: Using the Installation Manager installer to silently install both Installation Manager and z Systems Development and Test Environment

All steps assume that you are user root, installing as an Administrator, and that you uninstalled any previous instances of z Systems Development and Test Environment.

If you want to install Installation Manager in a different location from a previously installed Installation Manager, see the Installation Manager overview topic Working in silent mode.

1. Use the su command to switch to user root.
2. Mount the z Systems Development and Test Environment installation disk.
3. Use the cd command to change to the z Systems Development and Test Environment installation disk.
4. Use the cp command to copy SilentInstall/zdt1001\_response\_file.xml to a path where you can edit the file.
5. Open the editable response file in an editor and modify the file to add the offering element. To add the offering element, insert the following line before the line that is pointing to the existing offering element for IBM z Systems Development and Test environment

```
<offering features='agent_core,agent_jre'  
id='com.ibm.cic.agent' version='1.8.6000.20161118_1611' />
```

**Note:** This statement adds the offering element for Installation Manager to the existing offering for z Systems Development and Test Environment.

6. If silently installing the license manager, locate the existing offering statement in the response file that starts as follows:

```
<offering id='com.ibm.rational.development.test.environment.systemz ...
```

Change the **features='main.feature'** parameter to **features='licenseserver.feature'**.

7. Replace the existing repository location that is specified in the response file with the repository location of the Installation Manager and the z Systems Development and Test Environment product as follows:

```
<repository location='/absolute path to Installation disk/InstallerImage_linux.gtk.x86_64' />  
<repository location='/absolute path to Installation disc/disk1' />
```

The updated response file now contains all the commands necessary for the Installation Manager installer to install both Installation Manager and z Systems Development and Test Environment.

8. Save the updated response file.
9. View the license text for z Systems Development and Test Environment in file *xx.html*, where *xx* is your language of preference. You can find this file in the license directory of the installation disk.
10. View the license text for Installation Manager in file *license\_xx.txt*, where *xx* is your language of preference. You can find this file in the *InstallerImage\_linux.gtk.x86\_64/license* folder on the installation disk.
11. Use the **cd** command to change to the *InstallerImage\_linux.gtk.x86\_64* folder.
12. Enter the following command to install both Installation Manager and z Systems Development and Test Environment:

```
./installc input /absolute path to modified  
response file/zdt1001_response_file.xml -log  
log_file -acceptLicense
```

**Note:** This installation procedure installs the version of Installation Manager that is specified in the offering element entry you added when you edited the response file and does not automatically install a newer version of IBM Installation Manager if one is available. If you want to install a newer version of Installation Manager, you must edit the response file and specify the newer version.

---

## After you install z Systems Development and Test Environment

After you install z Systems Development and Test Environment with the IBM Installation Manager, you must make minor changes to your kernel configuration and add a few environment variables for the user IDs that are going to run z Systems Development and Test Environment.

After the IBM Installation Manager completes the program installation, you must complete these steps before you can enable and start the product.

If you installed the License Manager feature, you must start the UIM Server. For more information, see “Starting the license manager” on page 17.

If you installed the base z Systems Development and Test Environment and not the License Manager feature, you must add a few lines to */etc/sysctl.conf* and *\$HOME/.bashrc* on your Linux system. These updates can be made by using the two zPDT commands **aws\_sysctl** and **aws\_bashrc**. For more information about

these two commands, see the following topics. The zPDT Guide and ReferencezPDT includes additional information to consider, based on your specific Linux installation.

## Updating /etc/sysctl.conf

Run the **aws\_sysctl** zPDT command to update several of the Linux kernel parameters in `etc/sysctl.conf` that allow for zPDT execution.

Run the `aws_sysctl` zPDT command from root:

```
# /usr/z1090/bin/aws_sysctl
```

This command updates several of the Linux kernel parameters in `etc/sysctl.conf` that allow for zPDT execution, and then runs `/sbin/sysctl` to put them in effect. When prompted, enter `yes` to proceed. These changes are sufficient for most zPDT users. For the details on which parameters are updated, and which parameters might require change for especially large zPDT instances, see the *zPDT Guide and Reference* (SG24-8205).

## Updating \$HOME/.bashrc

Run the **aws\_bashrc** command to update the `.bashrc` file in the home directory of the user IDs that run z Systems Development and Test Environment.

After you update the `/etc/sysctl.conf` file, you must update the `.bashrc` file in the home directory of the user IDs that run z Systems Development and Test Environment. Because it is assumed that you are running as `ibmsys1`, from the `/home/ibmsys1/` directory, run the following zPDT command as follows:

```
$ /usr/z1090/bin/aws_bashrc
```

This command adds the appropriate zPDT PATH statements and updates some user limits in `.bashrc` to allow zPDT execution. When prompted, enter `yes` to proceed. See the zPDT Guide and Reference for the details on which statements are added or updated.

Double-check the entries in these Linux files. Errors here might be difficult to detect later.

After the `.bashrc` file is updated for a user ID, and a new Linux console is started for that user ID to activate those changes, any zPDT commands that can be validly run by that user ID can be run from any directory. These commands include the ones that are identified in the IBM Knowledge Center, such as the `z1090instcheck` command, and the commands that are identified in the zPDT Guide and Reference.

**Note:** You must be in the `/usr/z1090/bin` directory to enter the zPDT commands that are run from root.

## Checking the installation

After you update `$HOME/.bashrc`, start a new Linux console as user `ibmsys1` to activate the changes and run the **z1090instcheck** command.

If the command result shows errors, fix the errors before proceeding. The zPDT Guide and Reference contains more detailed information on the output that is returned from this command.

**Note:** The `z1090instcheck` instruction works for both z1090 machine types and z1091 machine types. There is no `z1091instcheck` instruction.

## Starting the license manager

If you installed the License Manager feature, the license manager function is automatically started. However, you must start the UIM server, generate and install software-based license key files, and configure the license manager clients to access those keys.

For the remaining steps to configure the license manager and clients, see these topics:

- Installing and starting the license manager
- Activating a license manager
- Activating and configuring a license manager client

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## Installing Rational Test Control Panel 9.0.1

z Systems Development and Test Environment includes access to the e-assembly for Rational Test Control Panel 9.0.1, one of the components of Rational Integration Tester.

Using Rational Integration Tester, you can test applications on IBM z/OS systems by using the mainframe support capabilities of IBM Rational Integration Tester. For an overview of Rational Integration Tester, see *Rational Integration Tester overview*. For an overview of testing applications on z/OS with Rational Integration Tester, see *Testing applications on z/OS*.

If you already use Rational Integration Tester and want to test applications on z/OS distributions that are running on z Systems Development and Test Environment, download the IBM Rational Integration Test Control Panel V9.0.1 e-assembly and install it. While Rational Test Control Panel itself does not run on z/OS, it is required to download the Rational Integration Tester tool packages needed for all supported z/OS testing. For an overview of how the IBM Rational Test Control Panel installation interacts with Rational Integration Tester, see *Rational Integration Tester installation topology*. For information on how to download the IBM Rational Integration Test V9.0.1 Control Panel Multipatform Multilingual e-assembly (CN4P7ML), follow the instructions in the *z Systems Development and Test Environment download information technote*. The installation instructions for installing the Rational Test Control Panel from the e-assembly can be found in *Installing Rational Test Control Panel*.

After you install Rational Integration Test Control Panel V9.0.1, you can then download, install, and configure the appropriate Rational Integration Tester tool packages that are needed for z/OS testing. Rational Integration Tester tool packages describes all available tool packages with installation and configuration instructions. Any of the packages that require z/OS installation or configuration can be installed and configured on the z/OS distribution that is running on z Systems Development and Test Environment.



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