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# Managing System and Applications Software with Oracle Solaris 11 Express

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## Introduction

Oracle Solaris 11 Express introduces an entirely new installation and application packaging system. The addition of this new functionality greatly enhances the way Oracle Solaris is initially installed and later updated.

This article introduces the new Oracle Solaris installers as well as the new packaging system used to install software and keep a system up to date.

## Oracle Solaris 11 Express Installer

Oracle Solaris 11 Express provides three avenues for getting the product installed:

- A graphical installer (x86 systems only)
- A text-based interactive installer An automated installer

It is expected that you will first use the graphical installer as you begin to evaluate Oracle Solaris 11 Express, move to the text-based installer for your headless data center machines, and ultimately use the automated installer to deploy Oracle Solaris 11 Express in larger quantities.

### The Graphical Installer

Oracle Solaris 11 Express is made available as a bootable (or live) CD for x86-based systems. The live CD allows you to experience Oracle Solaris 11 Express on your system before committing to installation.

On the desktop of the live CD, you can find a couple utilities of interest:

- The Device Driver utility, which checks whether Oracle Solaris 11 Express has the appropriate drivers for your system's devices
- The [GNOME Partitioning Editor](#), which you can optionally use for creating a new partition in which to install Oracle Solaris 11 Express

When you are ready to continue with the installation of Oracle Solaris 11 Express, you launch the Graphical Installer, shown in Figure 1, directly from the desktop. The streamlined Oracle Solaris 11 Express installer asks basic questions about the disk, time zone, locale, and users before completing the installation.

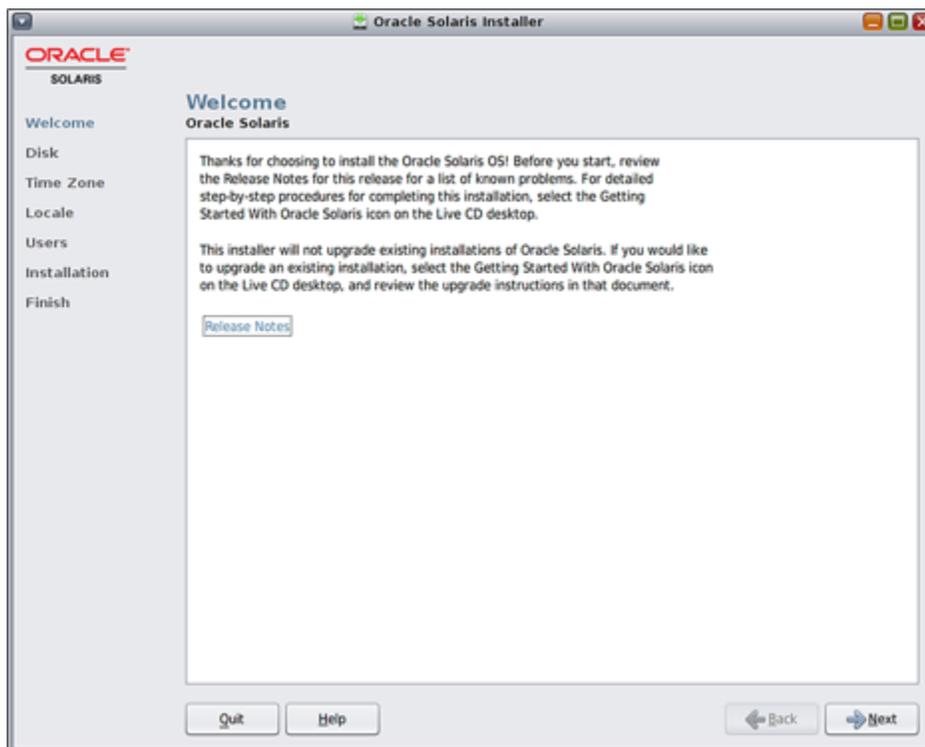


Figure 1. Graphical Installer

## The Text Installer

For x86 systems without a graphical display and for all SPARC systems, Oracle Solaris 11 Express is available through an interactive, text-based installer. Only a basic selection of software more suitable to server-based deployments can be installed using this method.

## The Automated Installer

When your evaluations are complete and you are ready to deploy Oracle Solaris 11 Express in larger quantities, you can turn to the Automated Installer (AI).

With AI, you configure a server that client machines can boot from to run the installation. The installation is configured via a manifest, and custom manifests can be specified based on machine criteria, such as IP address, MAC address, or available memory. Once the automated installation is complete, the machine is rebooted and immediately usable.

## Managing Software

Oracle Solaris 11 Express introduces the Image Packaging System (IPS) for managing system and application software. IPS delivers system updates and applications over the network and is tightly integrated with the ZFS file system to ensure system or application updates are complete. IPS also determines software application dependencies, ensuring everything that is necessary to run a software application is included during installation.

### Managing Application Software

Application software is delivered via a network-based repository, known as a publisher. The default publisher that ships with Oracle Solaris 11 Express is housed at <http://pkg.oracle.com/solaris/release>; however, additional publishers are available, and you can even set up your own publishers if desired.

The publishers are accessed from either the Package Manager graphical user interface or the command line.

### Package Manager GUI

The Package Manger GUI (shown in Figure 2) allows you to browse and install applications in the configured repositories, configure additional repositories, and manage boot environments (discussed later under “Managing System Software”).

Once the desired package is located in the Package Manager, you can view the files that comprise the package, dependent packages that will also be installed (if they are not already installed), the software license, and all available versions of the software.

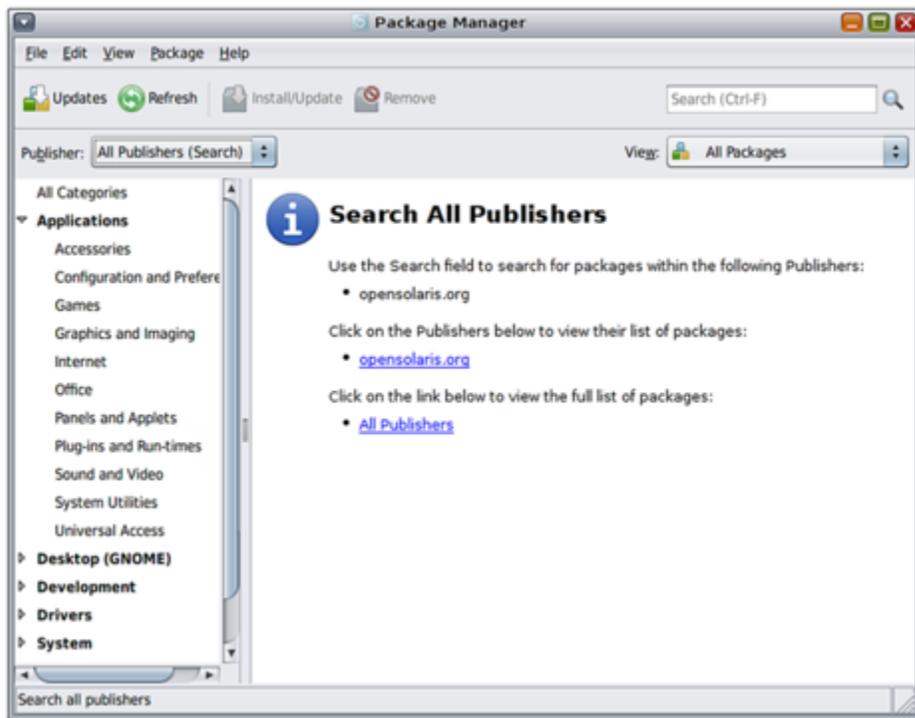


Figure 2. Package Manager

## Command Line

Oracle Solaris 11 Express introduces the `pkg(1)` command for managing software packages from the command line. Popular subcommands include `search`, `install`, `list`, `contents`, and `info`.

Generally, the process of installing a new application begins with a search:

```
$ pkg search -po pkg.name studio
PKG.NAME
desktop/studio/jokosher
developer/solaris-studio-express/analyzer
developer/solaris-studio-express/dbx
developer/solaris-studio-express/dmake
developer/solaris-studio-express/iblas
developer/solaris-studio-express/perflib
developer/solaris-studio-express/scalapack
developer/solaris-studio-express/solaris-studio-express-incorporation
developer/solaris-studio-express/studio-common
developer/solaris-studio-express/studio-ide
```

```
developer/solaris-studio-express/studio-legal
developer/solaris-studio-express/studio-netbeans
developer/solaris-studio-express
developer/sunstudio12u1
developer/sunstudioexpress
ss-dev
sunstudio12u1
sunstudio
sunstudioexpress
```

The `info` subcommand can then be used to get more information on a particular package:

```
# pkg info -r solaris-studio-express
      Name: developer/solaris-studio-express
      Summary: Solaris Studio Express - C, C++, & Fortran compilers and Tools
      Category: Development/C (org.opensolaris.category.2008)
                Development/C++ (org.opensolaris.category.2008)
                Development/High Performance Computing
                (org.opensolaris.category.2008)
                Development/Integrated Development Environments
                (org.opensolaris.category.2008)
                Development/Suites (org.opensolaris.category.2008)
      State: Not installed
      Publisher: opensolaris.org
      Version: 0.2010.6
      Build Release: 5.11
      Branch: 0.134.0.2
      Packaging Date: July  2, 2010 10:14:03 PM
      Size: 0.00 B
      FMRI: pkg://opensolaris.org/developer/solaris-studio-
            express@0.2010.6,5.11-0.134.0.2:20100702T221403Z
```

Once the desired package is located, the application can then be easily installed:

```
# sudo pkg install solaris-studio-express
      Packages to install:    26
      Create boot environment: No

DOWNLOAD          PKGS      FILES    XFER (MB)
Completed         26/26   10725/10725  336.8/336.8

PHASE              ACTIONS
Install Phase     14676/14676

PHASE              ITEMS
Package State Update Phase  26/26
Image State Update Phase    2/2
```

The `contents` subcommand displays the package's contents, including any dependent packages that are also required by the package (which will also be automatically installed if they are missing from your system). To view the contents of a package not yet installed, supply the `-r` (remote) option.

```
# pkg contents -rm solaris-studio-express
set name=pkg.fmri value=pkg://opensolaris.org/developer/solaris-studio-express@0.2010.6,5.11-0.134.0.2:20100702T221403Z
set name=variant.arch value=sparc value=i386
set name=pkg.summary value="Solaris Studio Express - C, C++, & Fortran compilers and Tools"
set name=info.keyword value="Fortran compiler module iropt optimizer autopar debug debugger debugging breakpoint parallelization tuning multi-thread multi-core productivity HPC linux collector platform xprofile profile profiling performance library blas lapack fftpack fft solver sparse C C++ OpenMP Studio IDE editor refactoring DLight"
set name=description value="Solaris Studio Express - C, C++, & Fortran compilers and Tools"
set name=variant.opensolaris.zone value=global value=nonglobal
set name=info.classification value=org.opensolaris.category.2008:Development/C value=org.opensolaris.category.2008:Development/C++ value="org.opensolaris.category.2008:Development/High Performance Computing" value="org.opensolaris.category.2008:Development/Integrated Development Environments" value=org.opensolaris.category.2008:Development/Suites
depend fmri=developer/solaris-studio-express/f77-libs@0.2010.6-0.134.0.2
type=require variant.arch=sparc
```

```
depend fmri=developer/solaris-studio-express/c++-libs@0.2010.6-0.134.0.2
type=require
...
depend fmri=developer/solaris-studio-express/backend@0.2010.6-0.134.0.2
type=require
```

### SVR4 Compatibility

Oracle Solaris 11 Express still supports the SVR4 package system used by Oracle Solaris 10 and earlier versions of Solaris. When you are presented with a choice of SVR4 or IPS packaging for a given piece of software, it is recommended that you select the IPS option.

Although SVR4 and IPS packages can coexist on a system, the two packaging systems are not aware of one another. Therefore, for example, if you tried to install an SVR4 version of a package on top of an IPS version, the installer would complain that it found existing files on disk, but otherwise it would not be aware that the application was already installed.

### Managing System Software

It's understandable that administrators are weary of patching their systems, especially in production environments where downtime must be kept to a minimum. It is for this reason that patches and upgrades to Oracle Solaris 11 Express are designed to be fast and reliable.

Oracle Solaris 11 Express introduces a new concept called a Boot Environment (BE). BEs take advantage of the underlying ZFS file system to take a snapshot of the Oracle Solaris 11 Express instance on the system.

When patches or upgrades become available for the system, a new BE is automatically created into which the updated files are installed. The update occurs to the new BE while the system continues to operate safely in production.

When the update is completed, you are free to reboot the machine on your schedule. The machine will automatically reboot into the new environment.

If for some reason the system fails to boot or other applications are adversely affected by the update, you can simply fall back to the existing BE, effectively restoring the system to the state before the updates were applied.

When updates become available, the system can be updated from either the Package Manager GUI or the command line by issuing the command `pkg image-update`.

Since the ZFS snapshots that underlie the BE are efficient and lightweight, it is recommended that you get in the habit of creating a new BE any time you plan to do something potentially disruptive to the system, such as editing a system configuration file.

BEs can be created manually from the command line using the [beadm command](#). The following example demonstrates how simple it is to create a new BE called myBE:

```
$ sudo beadm create myBE
```

The existing BEs on the system can be managed from either the Package Manger GUI or the command line. Once created, BEs can be activated, renamed, or deleted.

In the following example, the `list` subcommand is used to show the BEs on the system:

```
# beadm list
BE           Active Mountpoint Space  Policy Created
--          -
myBE        -      -           15.01M static 2010-10-01 13:28
solaris     NR      /            6.49G static 2010-10-01 16:04
```

## Conclusion

Oracle Solaris 11 Express introduces an entirely improved way of managing your system and application software. It begins with a much-simplified installation experience that provides an interface appropriate to your needs: a graphical interface, an interactive text interface, or a completely automated interface.

Fast and reliable, the Image Packaging System was designed from the ground up as a network-based software delivery mechanism. Relying on the underlying ZFS file system, IPS operations are guaranteed to leave your system in a consistent state—either the application installed successfully or it did not.

In the case of an installation failure, the entire file system is restored to its prior state. Contrast this with typical script-based clean-up tools, which are naturally prone to errors.

In addition, IPS takes the stress out of patching or upgrading your system. BEs provide a safe environment in which to apply updates, minimizing downtime to a simple reboot. If for some reason the update harms the system, you are simply another reboot away from restoring your system to its pre-updated state.

## For More Information

Here are additional resources:

- Oracle Solaris home page: <http://www.oracle.com/us/products/servers-storage/solaris/index.html>
- Oracle Solaris 11 Express on OTN: <http://www.oracle.com/technetwork/server-storage/solaris11/index.html>
- Oracle Solaris blog: <http://blogs.oracle.com/solaris/>
- The Observatory blog: <http://blogs.sun.com/observatory/>
- OTN Garage blog: <http://blogs.sun.com/OTNGarage/>



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Author: Brian Leonard

Oracle Corporation  
World Headquarters  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Worldwide Inquiries:  
Phone: +1.650.506.7000  
Fax: +1.650.506.7200  
oracle.com



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