London OpenSolaris User Group

Creating an OpenSolaris Build Server from IPS images

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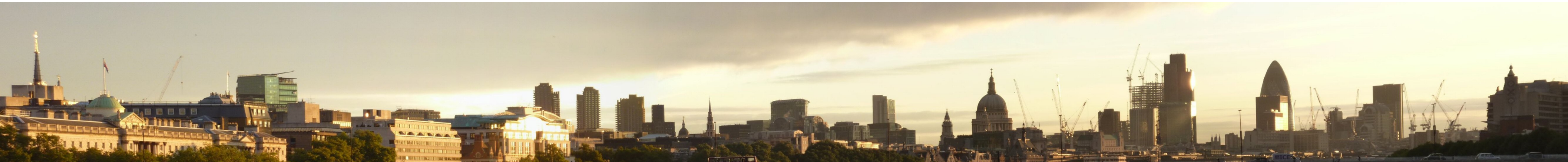
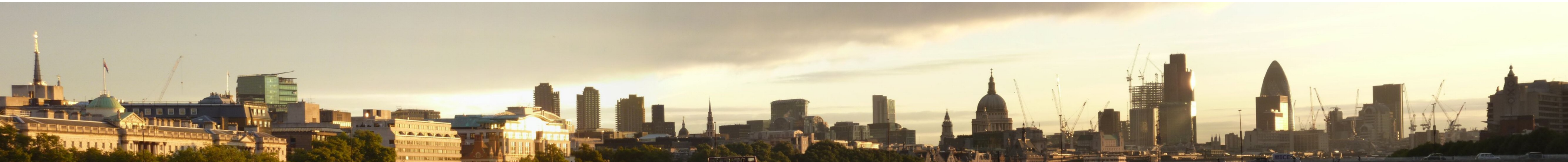
Overview

- What's changed: Solaris Express CE -> OpenSolaris
- Build server setup
- Building the OpenSolaris source
- Creating IPS packages from OpenSolaris binaries
- IPS packages



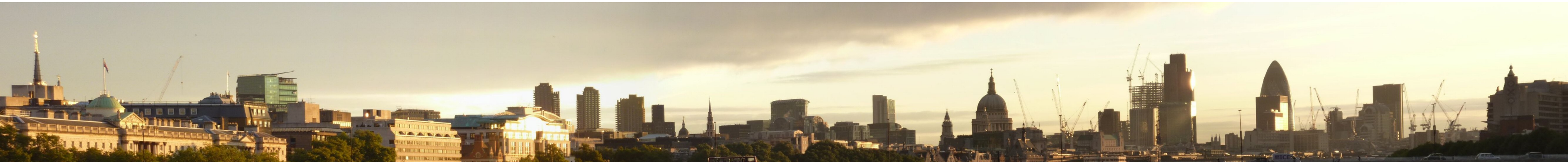
What's changed

- Solaris Express CE -> OpenSolaris
- What's changed wrt creating a build server
  - ZFS root
  - ZFS Boot Environments
  - Image Packaging System (IPS)
    - Will replace SVR4 packages
    - Package retrieval from network repositories
    - Better versioning and control over change
    - Awareness of zfs and smf



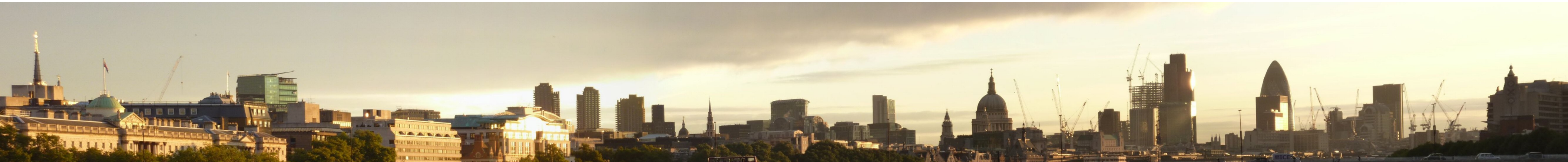
Build Server Setup Overview

- Sparc or x86 system
- Install OpenSolaris 2009.06
  - Bring it up to the latest development release
- Install build tools
- Install compiler
- Bring over copy of the source tree
- Need closed source binaries
- Environment setup



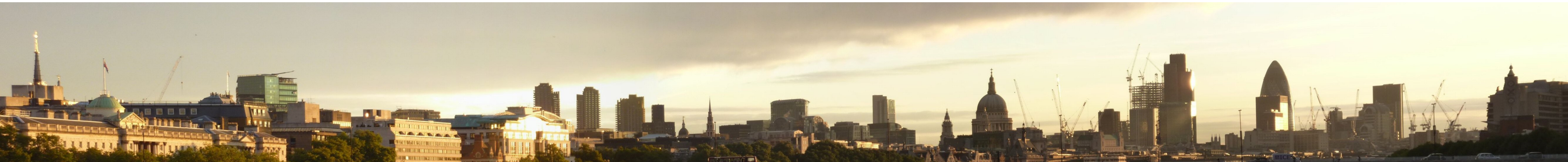
OpenSolaris Install

- Obtain a OpenSolaris 2009.06 CD installer
  - Request a free CD
  - http://hub.opensolaris.org/bin/view/Main/downloads
- Need to set up network access to the internet
- Upgrade to the latest OpenSolaris development release
  - Simply change repository
  - To view current repository: pkg publisher



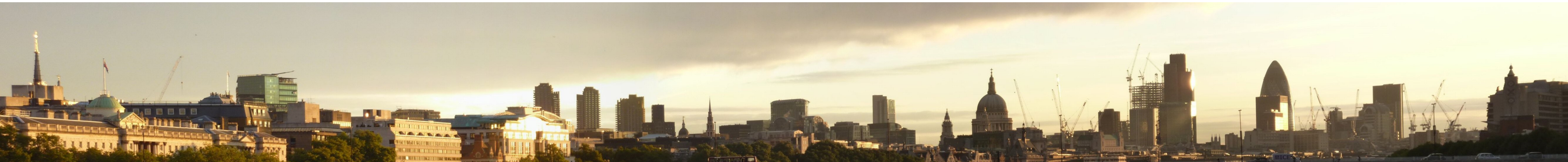
OpenSolaris Install

- Change repository from release to development
  - pkg set-authority -O http://pkg.opensolaris.org/dev opensolaris.org
- Firstly upgrade the IPS package image
  - pkg install SUNWipkg
- Now update all packages
  - pkg image-update
- Reboot to activate new BE.



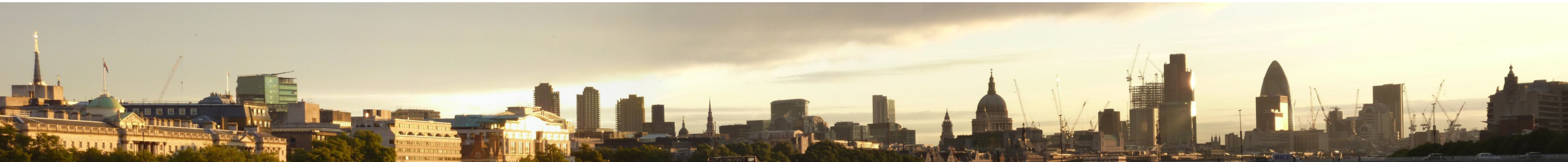
Install build tools

- http://hub.opensolaris.org/bin/view/Project+indiana/building_on
- Require access to the Extras repository
  - Request certificate to access Extras repository
    - https://pkg.sun.com/register
    - Provide Sun Online Account details
    - Select OpenSolaris Extras & submit
  - Store the certificate and key in /var/pkg/ssl
- Add the Extras repository
  - pkg set-publisher -k /var/pkg/ssl/OpenSolaris_extras.key.pem -c /var/pkg/ssl/OpenSolaris_extras.certificate.pem -O https://pkg.sun.com/opensolaris/extra/ extra



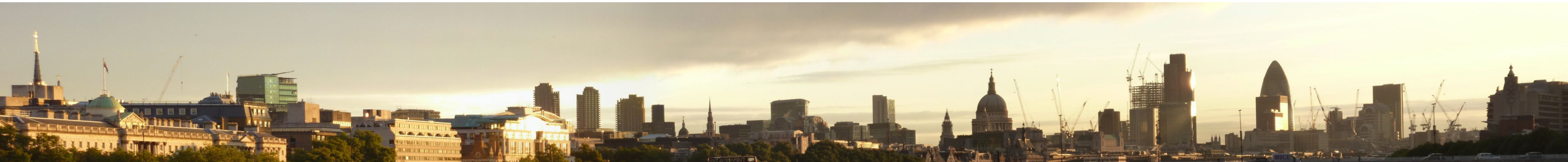
Install build tools

- To list repositories
  - pkg publisher
- Pull over the required build packages
  - pkg install SUNWmercurial
  - pkg install SUNWiscsitgt
  - pkg install SUNWgnome-xml
  - pkg install SUNWaudh
  - pkg install developer/opensolaris/osnet



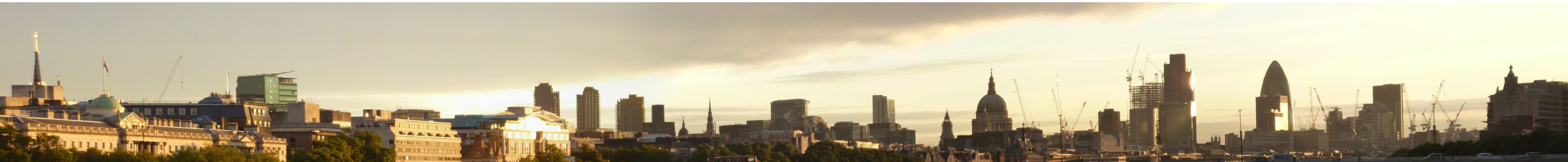
Install compiler & update PATH

- Sun Studio 12 compiler available as tar ball
  - http://hub.opensolaris.org/bin/view/Community+Group+tools/sun_studio_12_tools
- Select Sep 2009 Download – ON build 124 onwards
- Extract in /opt/SUNWspro
- Add compiler and ON build tools to PATH:
  - export PATH=/opt/SUNWspro/bin:/opt/onbld/bin: \
    /opt/onbld/bin/`uname -p`:$PATH



Source code

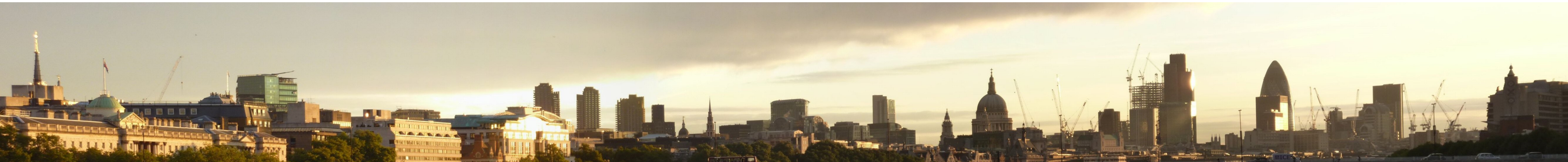
- OpenSolaris source held in Mercurial repository
  - See hg (1) man page
- Requires ssh connection to opensolaris.org
- Enable ssh compression to improve speed
- Decide where to place source tree, eg
  - `mkdir $HOME/src`
- Bring over the source tree
  - `hg clone <source> <destination>`



Source code

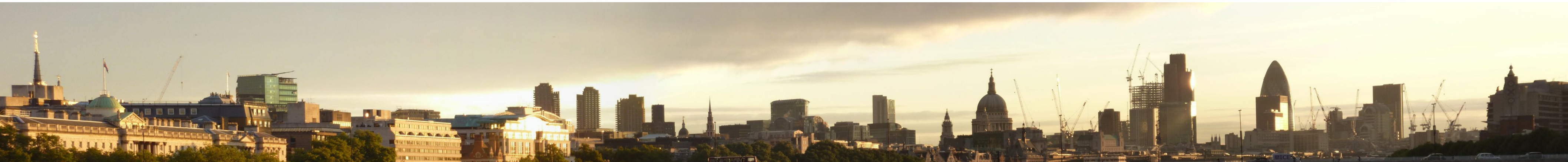
- Example:

```
$ cd $HOME/src
$ hg clone ssh://anon@hg.opensolaris.org/hg/onnv/onnv-gate onnv-clone
The authenticity of host 'hg.opensolaris.org (72.5.123.5)' can't be established.
RSA key fingerprint is 63:b9:7a:f3:dc:a4:47:a7:a5:50:ef:05:78:39:8d:ad.
Are you sure you want to continue connecting (yes/no)? yes
remote: Warning: Permanently added 'hg.opensolaris.org,72.5.123.5' (RSA) to the list of known hosts.
requesting all changes
adding changesets
adding manifests
adding file changes
added 11029 changesets with 131701 changes to 56822 files
updating working directory
45100 files updated, 0 files merged, 0 files removed, 0 files unresolved
```



Closed source binaries

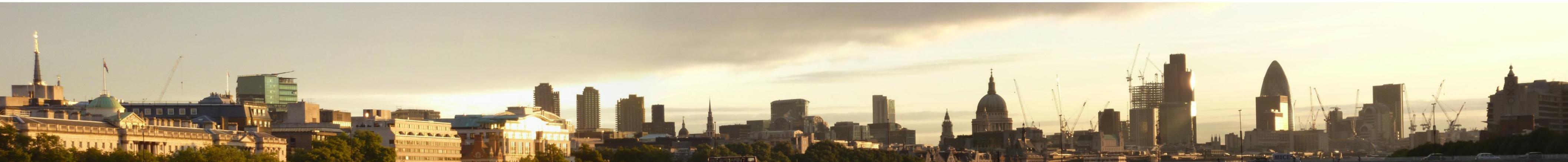
- Not all source code can be freely distributed
- Pre-compliled binaries are available instead
- Tar file bundle for both available at
  - http://dlc.sun.com/osol/on/downloads/current/
- OpenSolaris source can be built RELEASE and/or DEBUG
  - on-closed-bins-nd.i386.tar.bz2
  - on-closed-bins.i386.tar.bz2



Closed source binaries

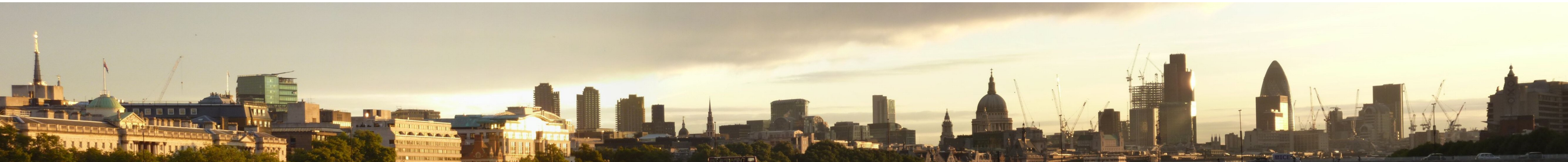
- Available for both sparc and x86 architectures
- Keep closed source binaries & source in sync
- Install at root of source:

```
$ cd $HOME/src/onnv-clone
$ bzcat /tmp/on-closed-bins-nd.i386.tar.bz2 | tar xf -
$ bzcat /tmp/on-closed-bins.i386.tar.bz2 | tar xf -
```



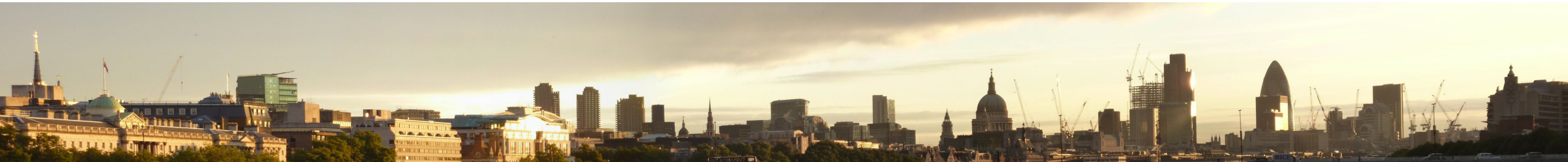
Build environment setup

- Configure environment before building
- Use opensolaris env file as template
  - cp /opt/onbld/env/opensolaris $HOME/src/onnv-clone/
- Alter the following variables:
  - Change GATE=on-clone
  - Change CODEMGR_WS=/full/path/to/src/$GATE
  - Uncomment CLOSED_IS_PRESENT="no"
  - Change STAFFER=your-id
  - Uncomment ONBLD_TOOLS=/opt/onbld



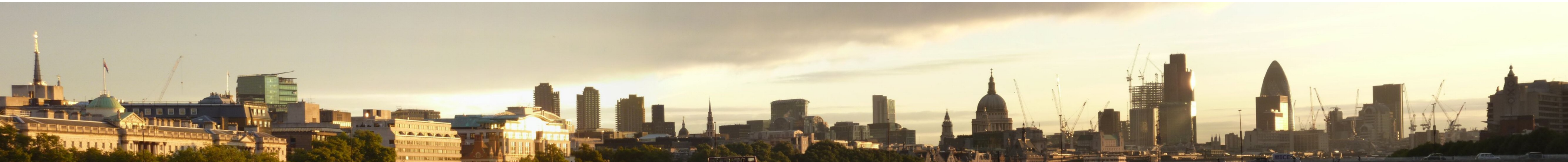
Full build of workspace

- Use the nightly script for a full build
  - See man page: man -M /opt/onbld/man nightly
  - nightly -n $HOME/src/onnv-clone/opensolaris
- A full nightly will populate the proto area with all binaries
  - $HOME/src/onnv-clone/proto/root_`uname -p`



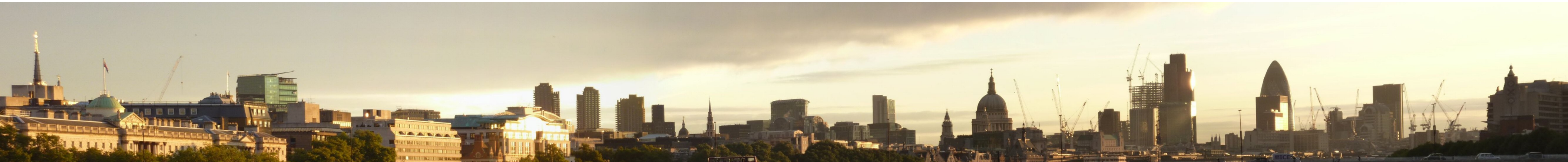
Build individual commands

- Once nightly completes can build individual commands/libraries/modules.
- Use bldenv script to set up environment
  - See man page: `man -M /opt/onbld/man bldenv`
- Example:
  - `bldenv $HOME/src/onnv-clone/opensolaris`
  - `cd $HOME/src/onnv-clone/usr/src/cmd/ls`
  - `make install`



Building IPS packages

- Building OpenSolaris as IPS packages not yet installed in main source tree
- Project gate is available as taster
  - hg clone ssh://anon@hg.opensolaris.org/hg/pkg/on_ips ips-clone
- Install closed binaries
- Copy env file and update variables accordingly
  - cp /opt/onbld/env/opensolaris $HOME/src/ips-clone/
- Perform a full nightly build
  - nightly -n $HOME/src/ips-clone/opensolaris



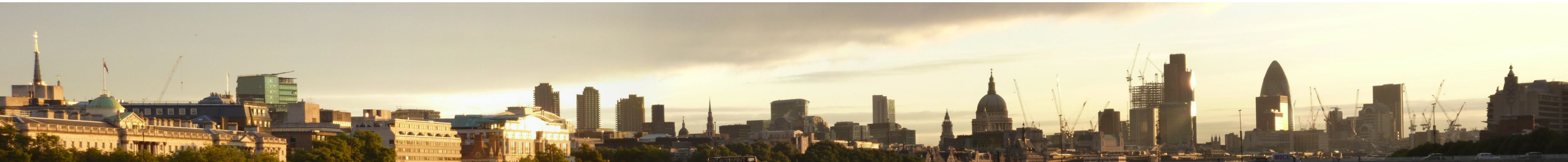
Building IPS packages

- Full build of the IPS packages

```
$ cd $HOME/src/ips-clone
$ bldenv -ct ./opensolaris
$ cd usr/src/pkg
$ dmake all check
```

- Problems
  - Need closed sources for SUNWos86r package
  - bash defaults overwrite the $PATH, use bldenv -c
- Can build individual package

```
$ make SUNWzfs
```



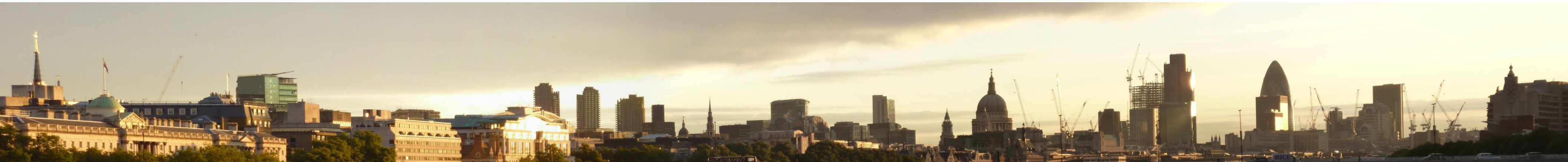
Building IPS packages

- Start the repository servers

```
$ /usr/lib/pkg.depotd -d `pwd`/repo.redist -p 13000
$ /usr/lib/pkg.depotd -d `pwd`/repo.extra -p 13001
```

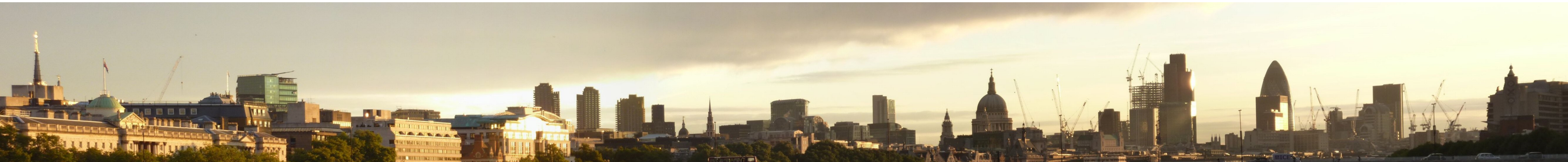
- Point browser at repository
  - http://localhost:13000
- Can update system with freshly built packages

```
# pkg set-publisher -P -O http://<hostname>:13000 on-nightly
# pkg set-publisher -O http://<hostname>:13001 on-extra
# pkg image-update
```



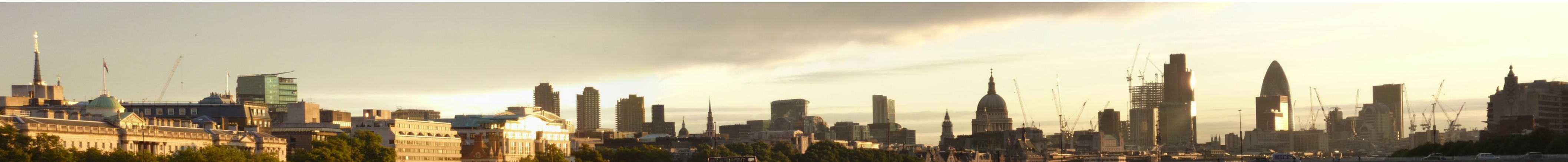
IPS & Solaris

- Currently Solaris is built as SVR4 packages
- Process to create IPS packages is manual, taking weeks from close of build to IPS pkgs
- Development and testing still done through SVR4 packages
- Project already underway to have the Solaris build by default create IPS packages



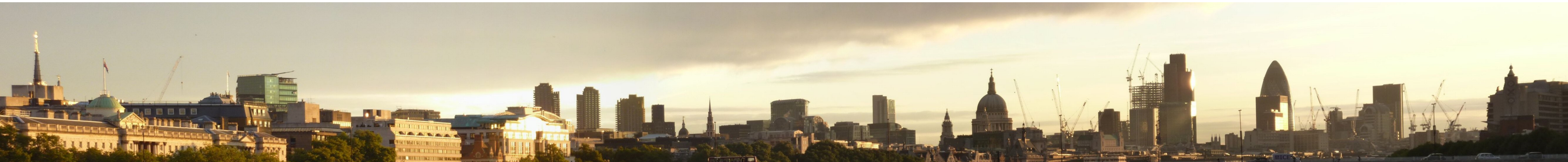
Creating an IPS package

- The steps being:
  - Build the binaries
  - Create a manifest file
  - Open a transaction to the repository
  - Send the files defined in the manifest
  - Close the transaction



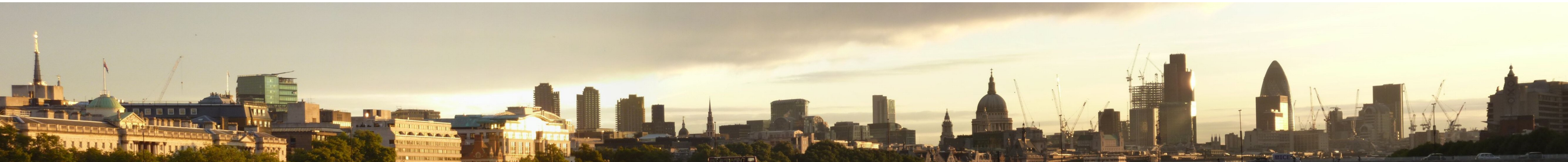
Creating an IPS package

- For the IPS gate the steps are performed by the Makefile in usr/src/pkg
  - Starts repository server pkg.depotd on localhost via standup script
  - For each manifest file in the usr/src/pkg/{redist|extra} directory
    - Runs preprocess_manifest script to strip out the FMRI
    - Runs publish_manifest_combined script on the processed manifest
      - Uses pkgsend to open the transaction
      - pkgsend the pre-processed manifest to the repository



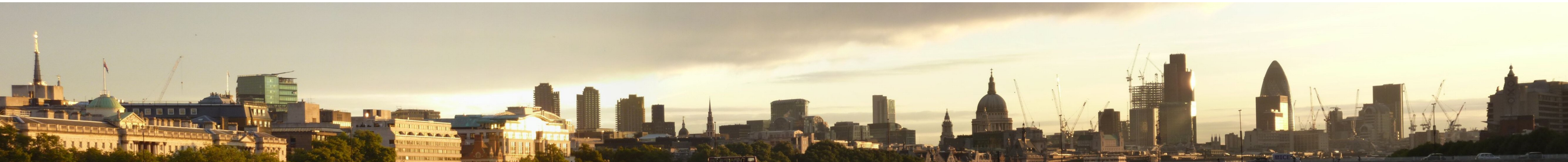
Creating an IPS package

    - Uses pkgsend to close the transaction
  - repository server places the package in usr/src/pkg/repo.redist or repo.extra on localhost
  - Rebuilds indicies via pkgsend when all packages have been processed
  - When Makefile completes kills the repository servers
- Can now make these repositories available:
  - `` /usr/lib/pkg.depotd -d `pwd`/repo.redist -p 13000 & ``
  - `` /usr/lib/pkg.depotd -d `pwd`/repo.extra -p 13001 & ``



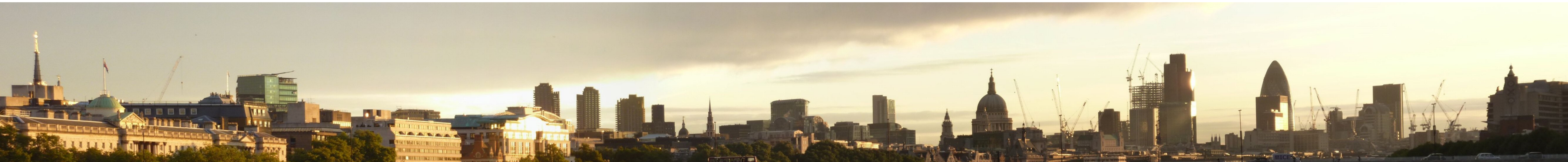
Example manifest file

```
$ cat redist/SUNWnetcat.manifest
set name=fmri value=pkg:/SUNWnetcat@0.5.11
set name=publisher value=opensolaris.org
set name=variant.arch value=i386
set name=info.classification value=org.opensolaris.category.2008:Applications/Internet
set name=description value="Netcat Command"
set name=pkg.summary value="Netcat Command"
set name=pkg.description value="Netcat Command"
set name=variant.opensolaris.zone value=global value=nonglobal
dir group=sys mode=0755 owner=root path=usr
dir group=bin mode=0755 owner=root path=usr/bin
file usr/bin/nc mode=0555 owner=root group=bin path=usr/bin/nc
legacy arch=i386 category=system desc="Netcat Command" hotline="Please contact...
```



Links

- OpenSolaris build guides
  - http://hub.opensolaris.org/bin/view/Project+indiana/building_on
  - http://hub.opensolaris.org/bin/view/Community+Group+on/devref_toc
- Downloads
  - http://hub.opensolaris.org/bin/view/Main/downloads
- Closed source binaries
  - http://dlc.sun.com/osol/on/downloads/current/
- Compiler
  - http://hub.opensolaris.org/bin/view/Community+Group+tools/sun_studio_tools
- IPS packages
  - http://blogs.sun.com/lianep/entry/building_an_on_ips_repository
  - http://src.opensolaris.org/source/xref/pkg/on_ips/usr/src/pkg/doc/README.src



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