

# Tribblix & the ISO image

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# BIO

- Sysadmin by day
- Developer by night
- Solaris beta programmes
- OpenSolaris from day 1
- OpenSolaris Board Member

# Transition to illumos

- The demise of OpenSolaris
- The rise of illumos
- Decided to branch

But what to call it?

# The Go Game 2008



# An Interesting Question

Which of the following is not an OpenSolaris distribution?

- Schillix
- Belenix
- Tribblix
- OpenSolaris 2008.05

# So what is Tribblix?

- Retro feel, modern components
- Lightweight desktops
- Speed and simplicity
- SVR4 packaging underneath
  - Enables sparse-root zones

# But why?

- Other distros didn't suit
- Wanted to go somewhere different
- Thirst for knowledge
- Keep me alert
- Helps understand inner workings

# E17

The image shows a Linux desktop environment with a sunset background featuring pyramids and a sphinx. Two terminal windows are open.

**Terminal 1 (Top):**

```
load averages: 0.01, 0.01, 0.01; up 4+17:35:33 21:40:41
53 processes: 52 sleeping, 1 on cpu
CPU states: 99.2% idle, 0.2% user, 0.6% kernel, 0.0% iowait, 0.0% swap
Kernel: 203 ctxsw, 169 trap, 307 intr, 308 syscall, 168 flt
Memory: 2048M phys mem, 196M free mem, 2048M total swap, 2048M free swap
```

PID	USERNAME	NLWP	PRI	NICE	SIZE	RES	STATE	TIME	CPU	COMMAND
16457	jack	1	59	0	77M	61M	sleep	12:36	0.23%	enlightenment
16424	jack	1	59	0	125M	55M	sleep	69:59	0.16%	Xorg
16490	jack	2	59	3	124M	19M	sleep	2:41	0.05%	Terminal
16555	jack	1	59	3	3724K	2232K	cpu	1:25	0.02%	top
121	root	1	59	0	2800K	1488K	sleep	0:07	0.00%	dhcpageant
10	root	12	59	0	7768K	5164K	sleep	0:17	0.00%	svc.startd
16543	jack	1	59	3	8748K	4908K	sleep	0:06	0.00%	enlightenment_f
187	root	6	59	0	4248K	2804K	sleep	0:03	0.00%	devfsadm
12	root	19	59	0	10M	8712K	sleep	2:32	0.00%	svc.configd
597	root	26	59	0	18M	11M	sleep	0:02	0.00%	fmd
43	netcfg	4	59	0	3920K	2620K	sleep	0:03	0.00%	netcfgd
247	root	4	59	0	9208K	6164K	sleep	0:07	0.00%	hald
255	root	1	59	0	3744K	1924K	sleep	0:05	0.00%	hald-addon-acpi
92	root	8	59	0	544K	468K	sleep	0:01	0.00%	acpid
559	root	11	59	0	10M	8712K	sleep	2:32	0.00%	svc.configd
205	root	5	59	0	18M	11M	sleep	0:02	0.00%	fmd
16544	jack	1	59	0	77M	61M	sleep	12:36	0.23%	enlightenment

**Terminal 2 (Bottom):**

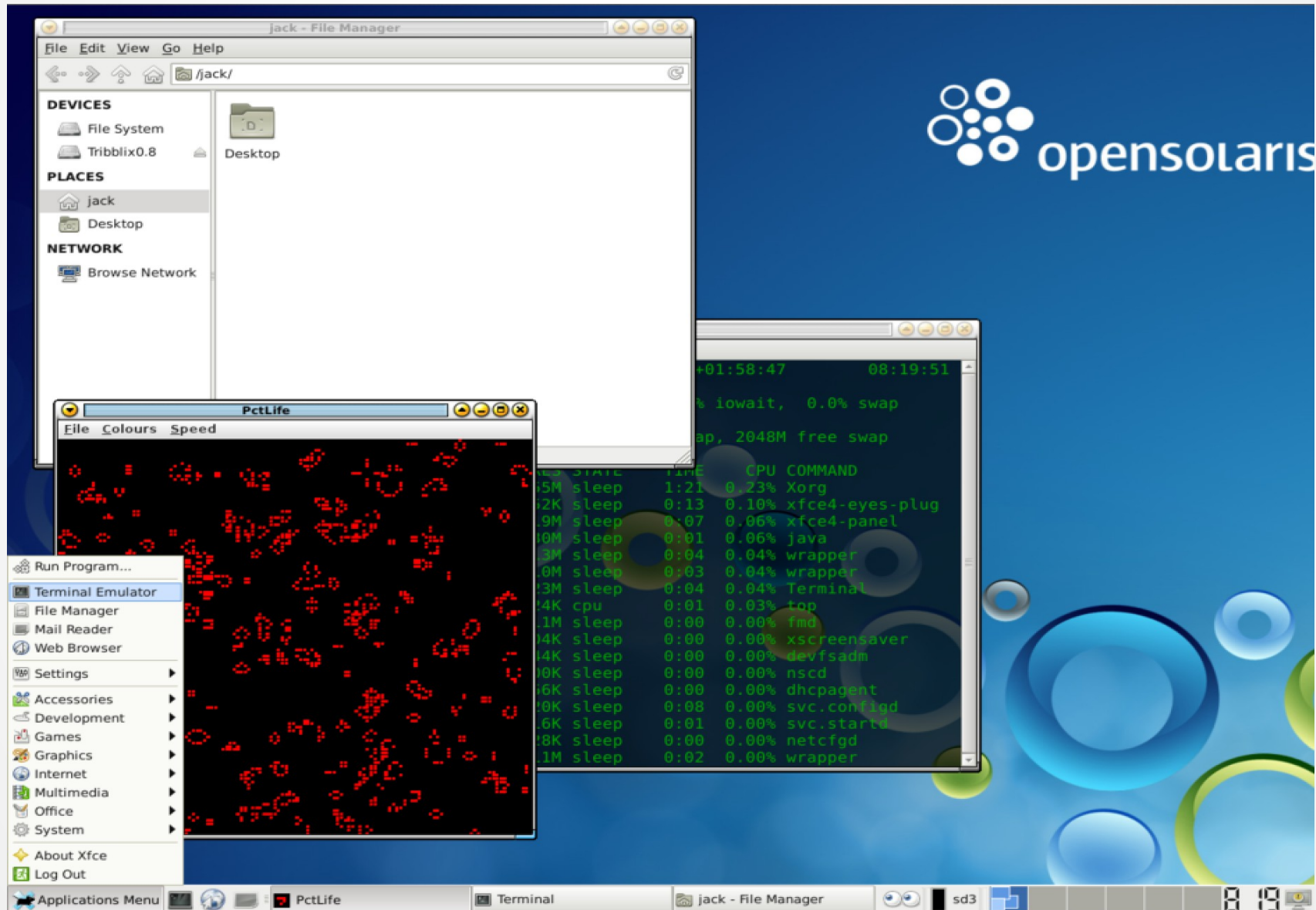
```
objfs / 3 13M 5444K 0K 0.00% 0K rpool 0% /system/object
sharefs OK OK OK 0% /etc/dfs/sharetab
/usr/lib/libc/libc_hwcap1.so.1 11G 3.4G 8.1G 30% /lib/libc.so.1
fd OK OK 0K 0% /dev/fd
swap 2.0G 12K 2.0G 1% /tmp
swap 2.0G 36K 2.0G 1% /var/run
rpool/export 16G 32K 8.1G 1% /export
rpool/export/home 16G 118K 8.1G 1% /export/home
rpool 16G 1.5M 8.1G 1% /rpool
/dev/dsk/c0t0d0s2 883M 883M 0K 100% /media/Tribblix0.9
jack@tribblix:~$ ls /media/Tribblix0.9/
boot pkgs platform solaris.zlib
jack@tribblix:~$ ls /media/Tribblix0.9/boot/
acpi grub solaris
jack@tribblix:~$ date
21 March 2014 21:03:10 PDT
jack@tribblix:~$
```



# And more...

- Window Maker
- AfterStep
- AWM, TVTWM, PIEWM
- IceWM, FVWM, openbox
- PekWM, fluxbox

# Xfce primary



# What's on the ISO?

- This is Solaris 11.1:

```
.SELF-ASSEMBLY-REQUIRED*  devices/          root/
.cdrom/                   export/          sbin@
.image_info               home/           solaris.zlib
.transfer-manifest.xml   jack/           solarismisc.zlib
.volsetid                 mnt/           system/
bin@                      platform/       tmp/
boot/                    proc/
dev/                     reconfigure
```

# Or a simpler version...

- This is Tribblix:

```
.catalog      boot/         platform/  
.volsetid     pkgs/         solaris.zlib
```

- The rest is unnecessary

# boot

- Basically grub (on x86)
- mkisofs → boot/grub/stage2\_eltorito
- menu.lst

```
title Tribblix 0.9
kernel$ /platform/i86pc/kernel/$ISADIR/unix
module$ /platform/i86pc/boot_archive
```

# platform

- Kernel – some distros allow 32 or 64-bit
  - Select with `$ISADIR`
- Boot archive – compressed image of a ufs file system
  - Mounted as ramdisk

# Boot or root archive?

- Regular boot – kernel, drivers, critical state files, just enough to mount root from boot device
- Live/install boot – contains the whole file system, as a ramdisk, no external root file system
- SmartOS is different

# Those zlib files

- See one or more in most distros
- solaris.zlib = /usr
  - / from root archive, /usr split off
- solarismisc.zlib – other fs
  - Tribblix avoids this
- SmartOS doesn't have either
  - Just a monolithic root archive



# What are they?

- hsfs file system
- lofi compressed
  - gzip compression
- lofiadm + mount

# .volsetid

- Present in the root archive
- Placed on the ISO
- Compare them to be sure you get solaris.zlib from the same place you booted the kernel from

```
# cat .volsetid  
7b8c6525d3ddb564b73e79622e8ae7e
```

# Mounting /usr

- Enumerate devices, match .volsetid
- Lofiadm solaris.zlib, mount /usr
- Need some files from /usr in the root archive to make it work
  - Trial and error...

# [Aside: PXE boot]

- PXE boot loads pxegrub and menu.lst
- Then grab kernel and root archive
- No media, so add wget to grab it

```
-B install_media=http://172.18.1.7:8080/
```

- Copy to /tmp, lfiadm, mount

# [Aside: boot arguments]

- Can see these: `prtconf -v /devices`

```
name='bootprog' type=string items=1  
value='/platform/i86pc/multiboot'
```

- Use `awk` and `sed` etc
- Or just use `devprop`...

# Building the files

- First, lay down your OS
- Doesn't matter how
  - IPS, SVR4, tar,.....
- Just so long as you have the whole OS located in an alternate root

# Boot archive

```
mkfile ${MRSIZE} /tmp/${MRSIZE}

LOFIDEV=`lofiadm -a /tmp/${MRSIZE}`

LOFINUM=`echo $LOFIDEV|awk -F/ '{print $NF}'`

echo "y" | newfs -o space -m 0 -i 24576 /dev/rlofi/$LOFINUM

BFS=/tmp/nb.$$

mkdir $BFS

mount -Fufs -o nologging $LOFIDEV $BFS

cd ${DESTDIR}

tar cf - $ALL_THE_FILES_NEEDED | ( cd $BFS ; tar xf -)
```

# Boot archive [2]

```
${DESTDIR}/usr/sbin/devfsadm -r ${BFS}

rm -f ${BFS}/dev/dsk/* ${BFS}/dev/rdisk/* ${BFS}/dev/usb/h*

rm -f ${BFS}/dev/removable-media/dsk/* ${BFS}/dev/removable-media/rdisk/*

mkdir .cdrom

cp ${DESTDIR}/.volsetid .

touch etc/mnttab reconfigure .lived

cp -p ${DESTTOP}/prebuilt/repository.db ${BFS}/etc/svc/repository.db

umount $BFS

lofiadm -d /dev/lofi/$LOFINUM

gzip /tmp/${MRSIZE}
```



# solaris.zlib

```
mkisofs -o solaris.zlib -quiet -N -l -R \  
-U -allow-multidot -no-iso-translate \  
-cache-inodes \  
-d -D -V "compress" usr
```

```
lofiadm -C gzip solaris.zlib
```

# Creating the ISO

- First move the junk to one side

```
/usr/bin/mkisofs -o ${ISODIR}/${ISONAME} \  
-b boot/grub/stage2_eltorito \  
-c .catalog -volset `cat ${DESTDIR}/.volsetid` \  
-no-emul-boot -boot-load-size 4 -boot-info-table \  
-N -l -R -U -allow-multidot -no-iso-translate \  
-cache-inodes -d -D \  
-V "Tribblix0.9" ${DESTDIR}
```

# Live media gotcha

- Live boot is different
  - /usr from solaris.zlib
  - Prompts, automatic login, installer
- Special SMF service
  - Disable the regular fs mount
- Remove that service once installed

# Installation

- Create an rpool, lay out datasets
- Mount new root at /a
- Cpio the booted image to that
- Remove the live media package
- Set properties and grub

# Customizations

- Always start with the live image
- IPS-based don't allow from the CD
  - Hence the multiple images
- Tribblix does, arbitrary selection
  - That's what's in pkgs on the ISO

# ZFS root

- Need to set bootfs property

```
zpool set bootfs=rpool/ROOT/tribblix rpool
```

- And uuid

- Otherwise, zone destroy fails

```
zfs set org.opensolaris.libbe:uuid=XXX \  
rpool/ROOT/tribblix
```

# Boot sign

- Set on pool

```
touch /rpool/boot/grub/bootsign/pool_rpool
```

```
echo "pool_rpool" > /rpool/etc/bootsign
```

- And grub

```
findroot (pool_rpool,0,a)
```

```
bootfs rpool/ROOT/tribblix
```

```
kernel\$\ /platform/i86pc/kernel/\$ISADIR/unix  
-B \${ZFS-BOOTFS}
```

# UFS root

- Tribblix doesn't care
- Boot sign like ZFS
- Need to add to vfstab
- Configure in bootenv.rc

```
setprop bootpath $BOOTDEV
```



# NFS

- Start with PXE boot
  - Load kernel, boot archive
- Tell it where root lives

```
-B bootfs="172.18.1.25:/storage/vega"
```

- rarp + bootparams
- Need to add / to vfstab

# Demo

# Q & A

- Questions?
- Suggestions?

# Thank You!

<http://www.tribblix.org/>

<https://github.com/tribblix>