Oracle Solaris

Operating Systems Design
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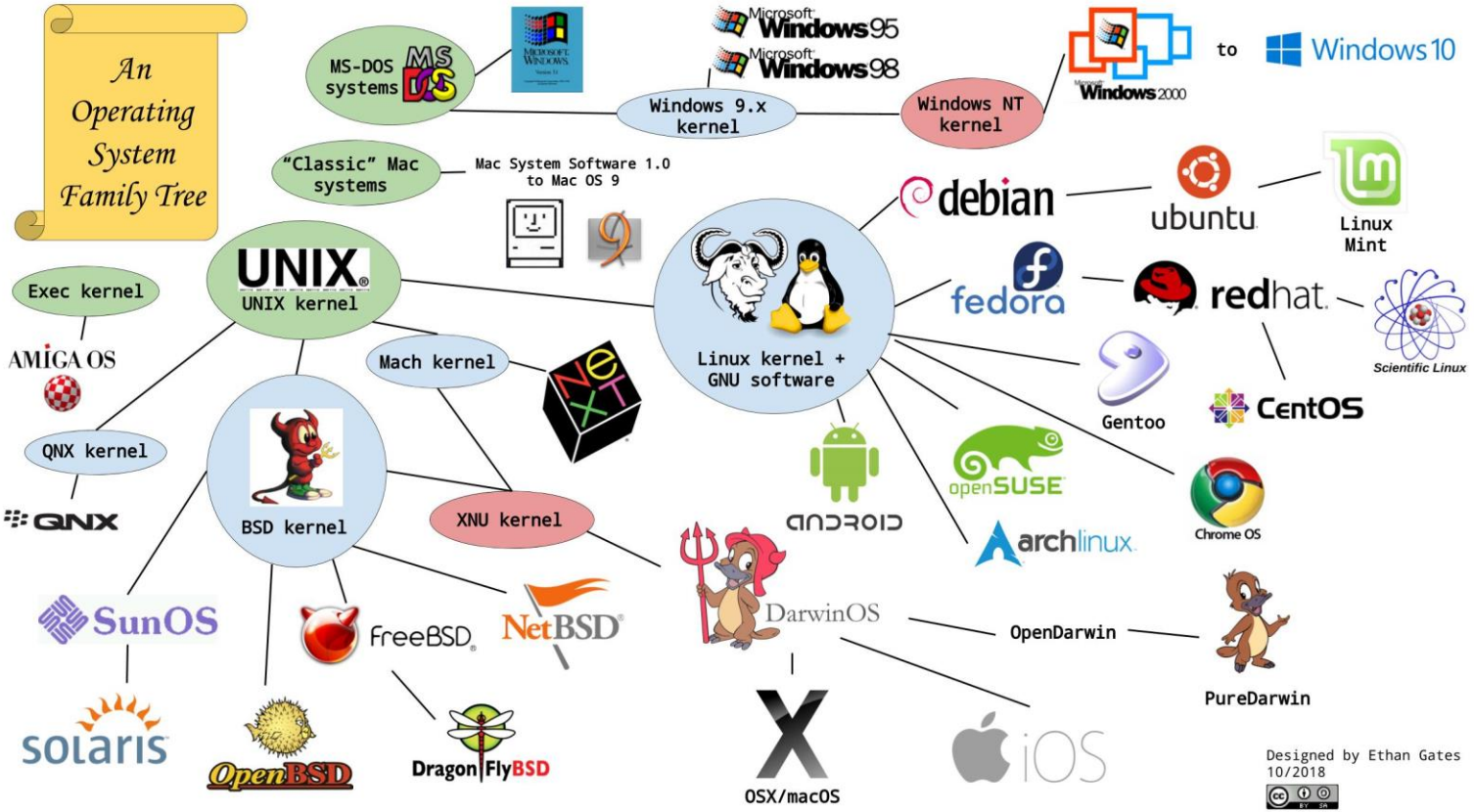
What is Oracle Solaris?

- Solaris is a Unix-like OS originally developed by Sun Microsystems as a successor to SunOS.
- Solaris is an officially approved Unix system and works on SPARC and X86 architectures for servers and workstations.
- Solaris superseded SunOS in 1993.
- Became known for its scalability and for originating many innovative features such as Dtrace, ZFS, and Time Slider.


An Operating System Family Tree
MS-DOS systems
Windows 9.x kernel
Windows 95
Windows 98
Windows NT kernel
Windows 2000
to
Windows 10
"Classic" Mac systems
Mac System Software 1.0 to Mac OS 9
UNIX
UNIX kernel
Exec kernel
AMIGA OS
QNX kernel
QNX
Mach kernel
NeXT
BSD kernel
XNU kernel
Linux kernel + GNU software
debian
ubuntu
Linux Mint
fedora
redhat
Scientific Linux
Gentoo
CentOS
openSUSE
Chrome OS
ANDROID
archlinux
SunOS
FreeBSD
NetBSD
DarwinOS
OpenDarwin
PureDarwin
solaris
OpenBSD
DragonFlyBSD
OSX/macOS
iOS
Designed by Ethan Gates
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Solaris vs Linux

	Linux	**Solaris**
Used for	Mobile phones and embedded tablets	Service management
Developed with	C	C and C++
Throughput	Linux has decent throughput	Solaris has an excellent throughput
License Required	Open-source OS with no such requirement	Licensed after Oracle purchased Sun Microsystems
Installation	Simple with Kickstart Instillation	Requires an automated installer before installing the OS
Support	Wide support with regular updates	Software updates and is released in batch
Management	Does not have a management facility	System Management Facility (SMF)

History of Solaris

Solaris

- *Originally proprietary software 1992-2004*
- *OpenSolaris - Sun Microsystems released the codebase under the CDDL license 2005-2010*

Oracle Solaris

- *Oracle acquisition & discontinue OpenSolaris 2010-present*
- *Oracle discontinued providing public updates to source code of Solaris kernel*

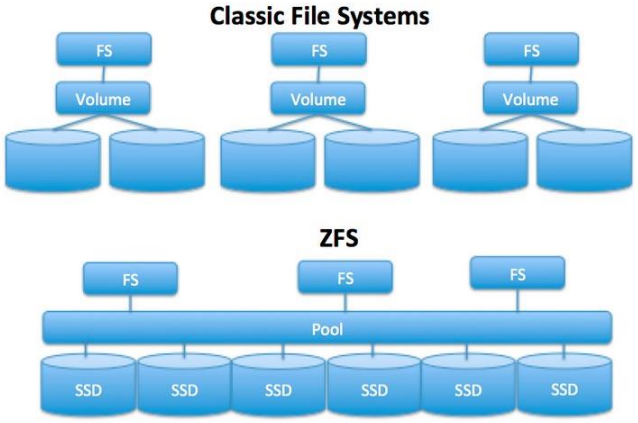
Platforms

- Initially targeted Sun's SPARC hardware architecture and later expanded support to other hardware platforms
- Uses a common code base that supports SPARC and x86 (Solaris 10 designed with AMD64 in mind)
- Very competent for symmetric multiprocessing (SMP)
- Scalability, interoperability, and portability are advantages of Solaris
- Stands out for having a binary interface application (ABI) which runs the software on any OS that has an identical microprocessor architecture
- Capable of running on different devices, even if they belong to large environments

Features

- Robust fault management capabilities, ensuring system remains stable in the face of hardware failures
- The ABI leads to decreased costs of software development, faster landing of products in markets, reduced costs of conversion and more
- Widely used in enterprise computing – large data centers and high-performance computing environments
- Provides advanced virtualization technologies that allow multiple OS and applications to run on a single physical server
- Has many tools for network management and monitoring
- Support for file systems like ZFS for advanced data protection and management capabilities and the ability to manage large storage arrays

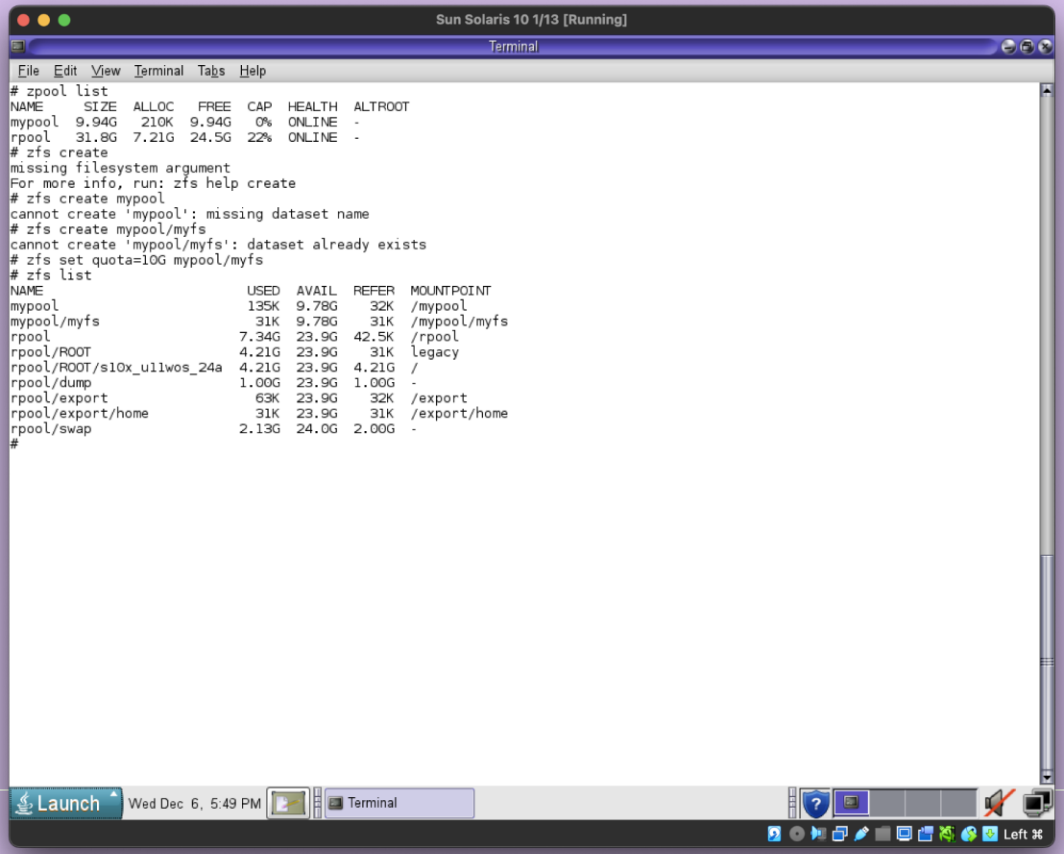
ZFS



- Began as part of the Solaris OS version 10
- Combines features of a file system and a volume manager
- Uses snapshots to track changes made to the file system
- Snapshot is the original version of the file system and live filesystem contains the changes made since snapshot was taken
- No additional space is used. As new data is written, new blocks are allocated
- Snapshots can be cloned to form new independent file systems
- Has the ability to take a pool snapshot (called a checkpoint) which allows rollback of operations that affect the file structure

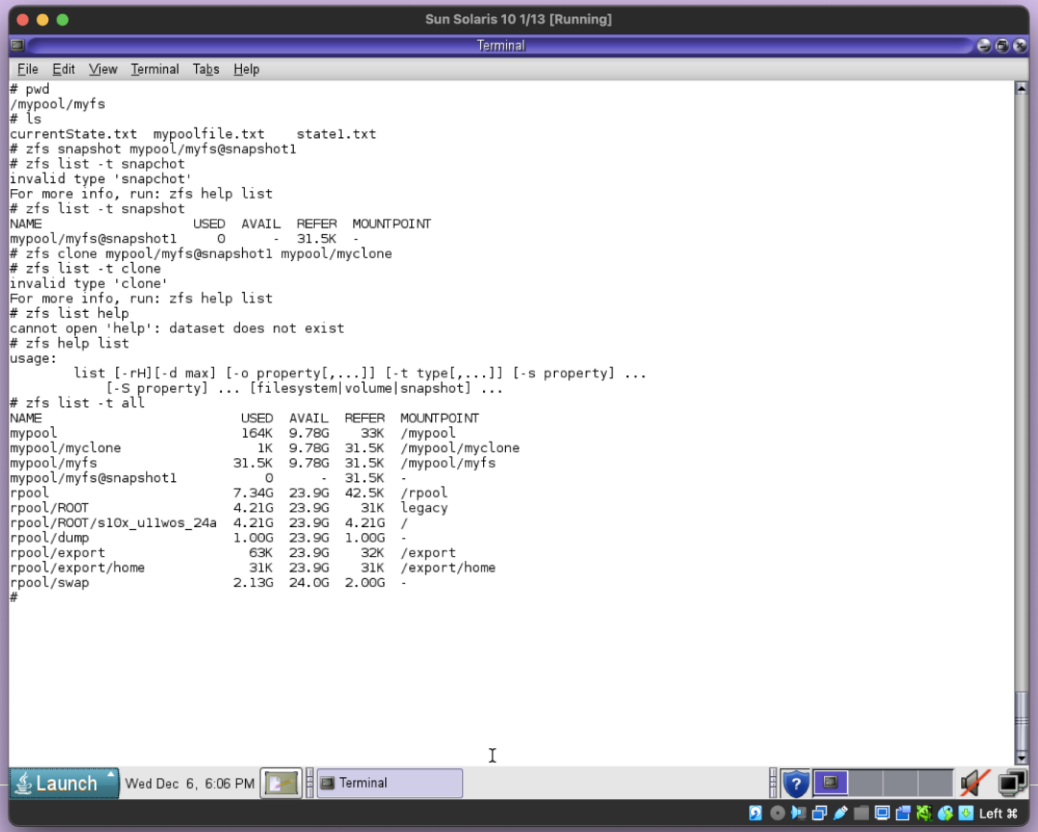
Demo - Snapshots

1. Create zpool
2. Create ZFS file system in pool
3. Set properties



Demo - Snapshots

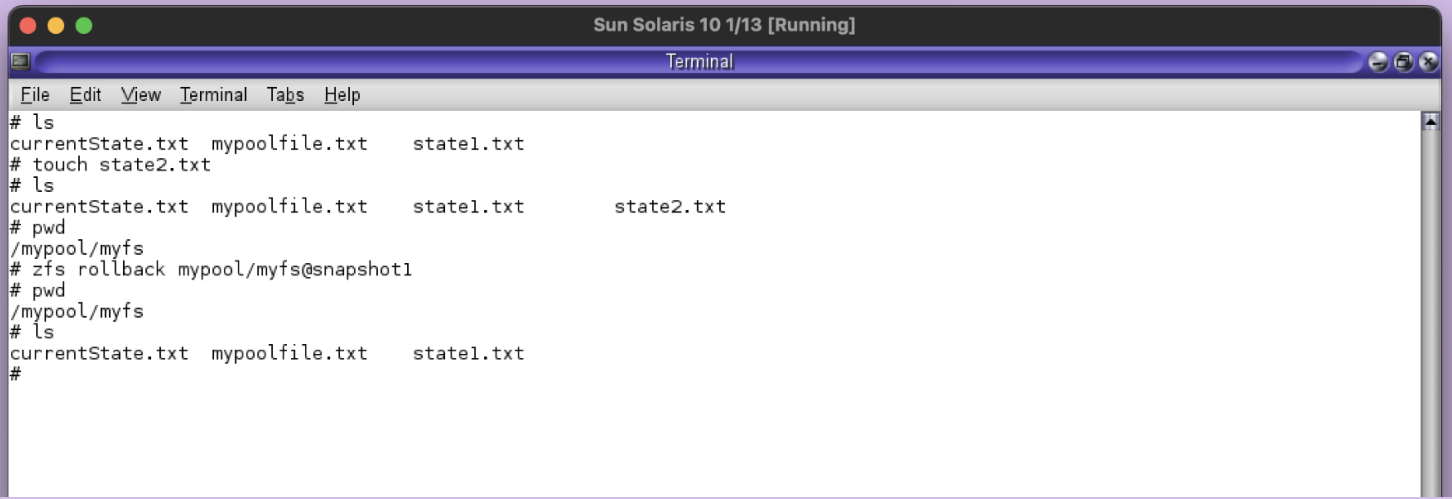
1. Create files
2. Take snapshot
3. List snapshots
4. Create a clone from snapshot (writable copy)
5. List ZFS snapshots and file systems



Demo - Snapshots

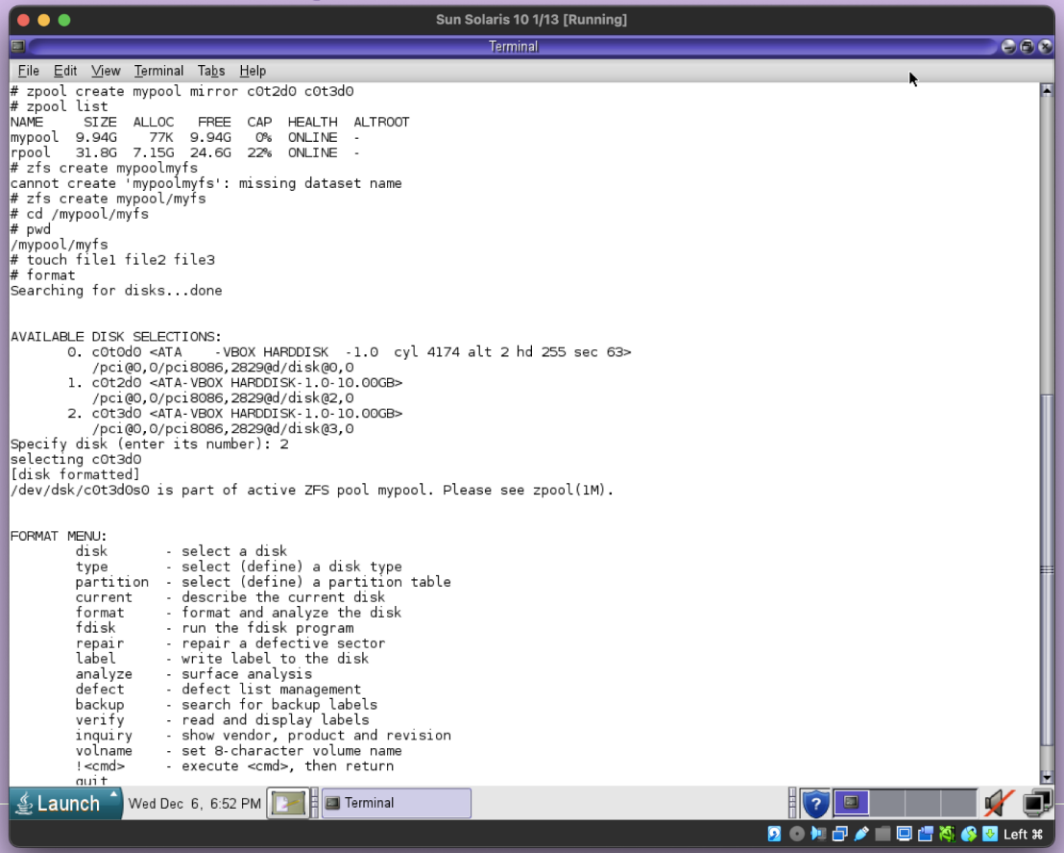
1. Create a new file
2. Rollback to snapshot
3. New file is gone

* You can also send a receive snapshots between pools



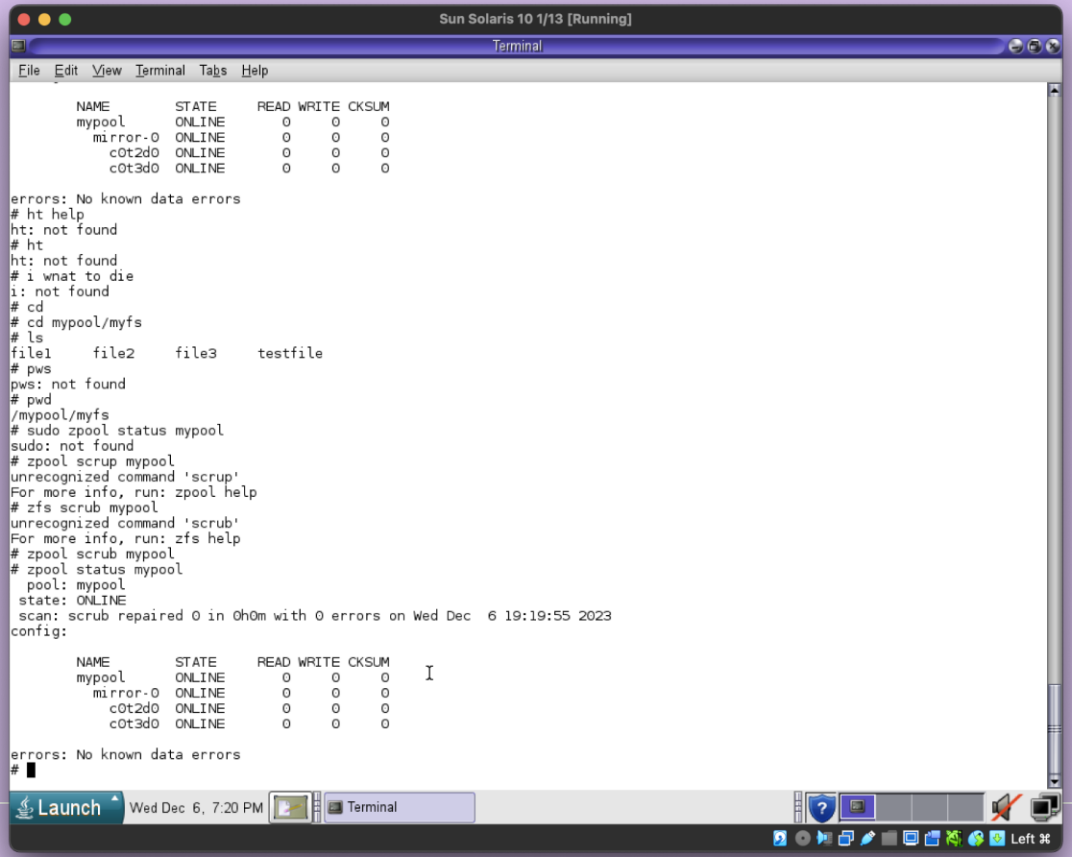
Demo – Scrubbing

1. Set up redundant ZFS pool
2. Create file system in pool
3. Add files



Demo – Scrubbing

1. Simulate disk corruption (overwrite small part of disk)
2. Perform ZFS scrub



Demo – Alternative Results

dd if=/dev/zero of=zfs-test/tank-file$i bs=1G count=1 &> /dev/null; done

```
sudo zpool scrub tank1; sudo zpool status -v tank1
  pool: tank1
 state: ONLINE
status: One or more devices has experienced an error resulting in data
        corruption.  Applications may be affected.
action: Restore the file in question if possible.  Otherwise restore the
        entire pool from backup.
   see: http://zfsonlinux.org/msg/ZFS-8000-8A
  scan: scrub repaired 0 in 0h0m with 1 errors on Sun Jan 11 20:16:30 2015
config:

        NAME                                STATE     READ WRITE CKSUM
        tank1                               ONLINE       0     0     1
          /home/kenny/zfs-test/tank-file1   ONLINE       0     0     2

errors: Permanent errors have been detected in the following files:

        tank1@snapshot2:/test-text-file
```

Works Cited

https://docs.oracle.com/cd/E23824_01/html/821-1453/gexkw.html

https://serverfault.com/questions/658819/zfs-recover-or-repair-a-corrupted-file-in-a-snapshot-from-backup

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https://docs.oracle.com/en/operating-systems/solaris.html

https://itsfoss.com/what-is-zfs/