Oracle Database Administration

IN 14 WEEKS

About me

Oracle DBA at SCC/Profidata

10+ experience in administrating Oracle databases

Blogger:

http://altik.blogspot.ro/

http://talek.github.io/blog/

Open source contributor:

http://talek.github.io/vorax4/

Meetup group:

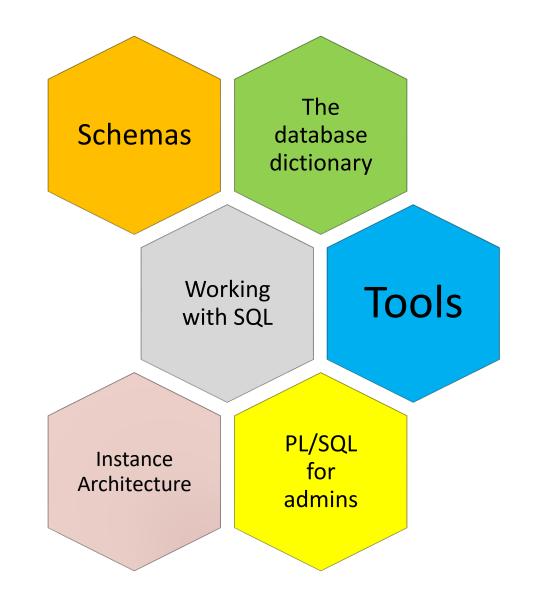https://www.meetup.com/Iasi-Database-Administrators-and-Developers-Meetup/

Week 1-2

Introduction to Oracle Database Administration
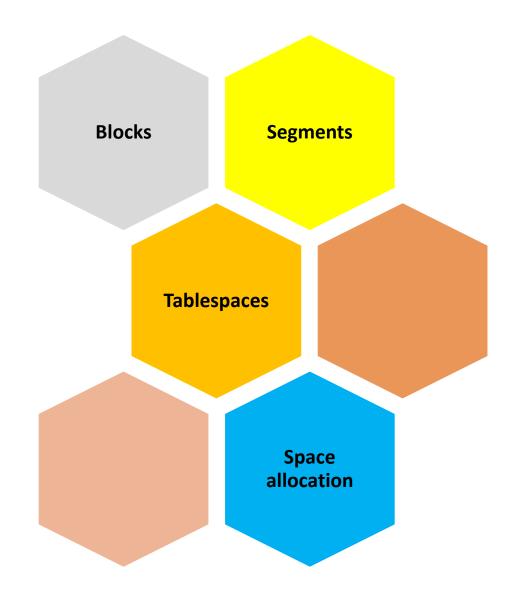
What is a database

Basic Linux administration

Installing a new Oracle database

Week 4
Important Oracle Physical and Logical Structures

Blocks

Segments

Tablespaces

Space allocation

Week 5
Assessment 1 – The Physical Schema

1. Chose a database application that is of interest for you. It must use Oracle as the database server. You should have minimum 5-6 tables. It's ok to use the database schema from a previous project.

2. Implement a script for tablespace creation. The tablespaces should be specific for you application. The way you create the tablespaces (their characteristics) should make sense. You will be asked to explain why and how did you create them.

Pay attention to:

- the CREATE TABLESPACE command. You will be asked questions to make sure you understood the options of the command.

- use different folders to simulate data distribution on different disks. For example /ora/disk1, /ora/disk2.

3. Implement a script for objects creation. You should focus more on the physical schema rather than the logical one.

Be careful with:

- the application schema. The database objects should be included in a separate schema (not sys/system) so the script should include the command for schema creation with appropriate privileges

- the properties used at the segment level, so that their allocation matches the tablespaces previously created. Also, the segment attributes should cover as much as possible the physical schema.

- the segment types (there might be more than just tables and indexes)

Week 6

Instance tuning and troubleshooting

Memory Size

Redo Logs

Troubleshooting

Week 7-8
SQL Tuning

Explain Plans

SQL Tuning strategies

Optimizer stats

Week 9
Assessment 2
Tuning

1. Implement a script for inserting data into the tables designed in the "Assessment 1". At least one table should have hundreds of thousands of rows (>100000) (use PL/SQL logic to do it). If it takes too much time to insert the data, you can come with the tables already populated.

2. Each member of the team must prepare at least 3 queries that need optimization: one query with weak selectivity, one with good selectivity and one with joins. You should provide a description of the purpose of each query (from a business perspective). Then you must obtain the execution plan of each query and interpret it. Then you will apply optimization techniques to make the queries more efficient. Obtain the new execution plan and explain why it is better than the previous one.

Pay attention to:
- the optimization criteria (number of logical reads, execution time)
- optimization technique (indexes, restructuring of the SQL query)

Week 10-11
Oracle Database Security

Authentication → Privileges → Audit

Week 12-13

Backup and Recovery

How to backup | How to recover | Crash scenarios

Week 14
Assessment 3 – Security, Backup & Recovery

1. Implement the security component of the application at the database level. For your application identify the main user types, the privileges they need (write/read on specific tables), etc. For each category create an Oracle role and grant the necessary privileges. Create at least one user for each category and grant the specific Oracle role. Then build a scenario (read/write data) that proves that the privileges work for each role.

2. Chose one user of the application and implement an audit strategy for him. Specify what you want to audit, why and the solution. Prove that the solution works by writing a test scenario.

3. Design a backup and recovery strategy for the database. The strategy must contain RPO and RTO requirements and a description of the way these requirements are met.

4. Create a script that does the backup and then imagine a "crash" scenario with the necessary steps required for recovering the data, based on your backup strategy.

Important

Besides the scripts that you will create, you will need to include the descriptive part of the project in a Word/PDF document which will clearly present the optimization strategy, test scenarios, etc. The scripts don't need to be part of the document, but you must make notes about the files in which they are.
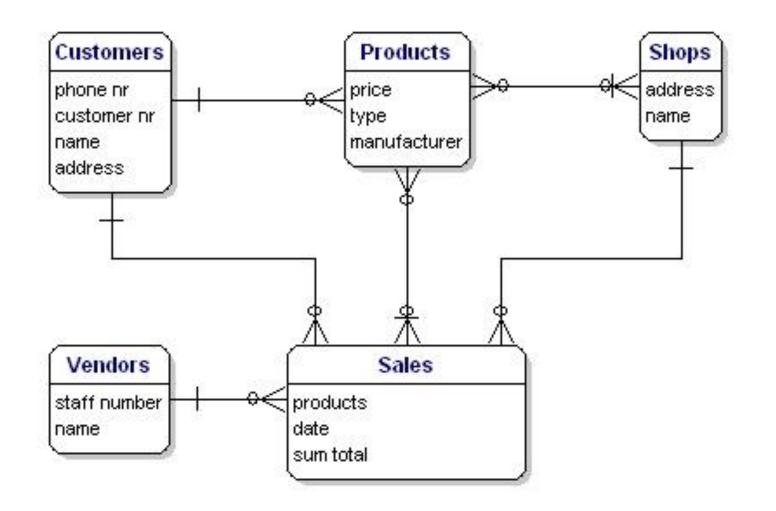
Let's start! Ready?

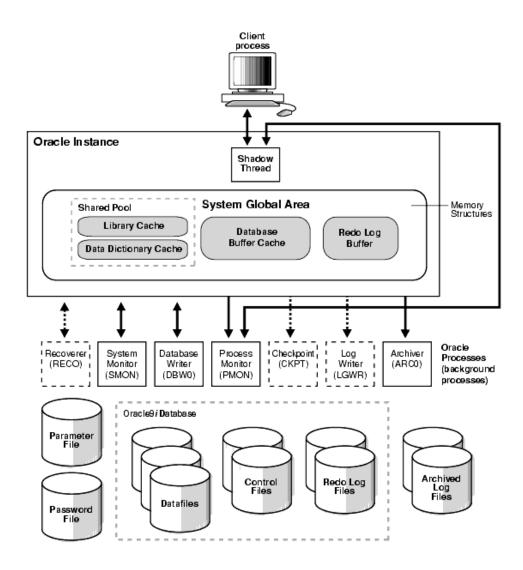Week 1

What is a database?

Challenge

DRAW A DATABASE

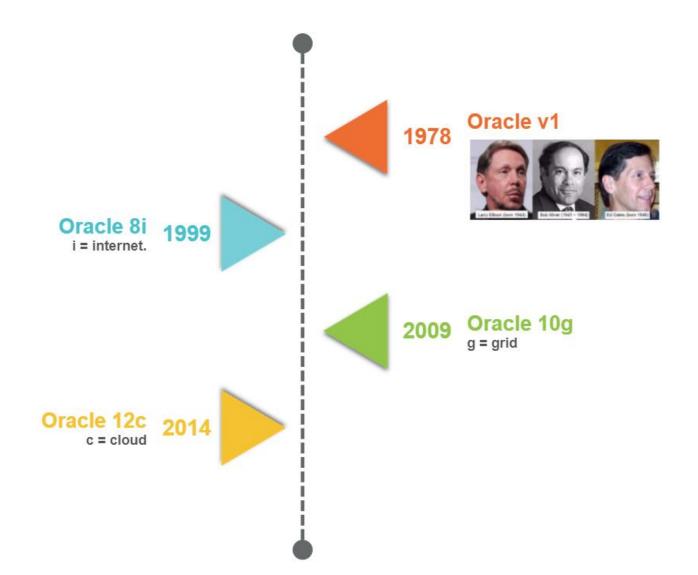The Management View

The
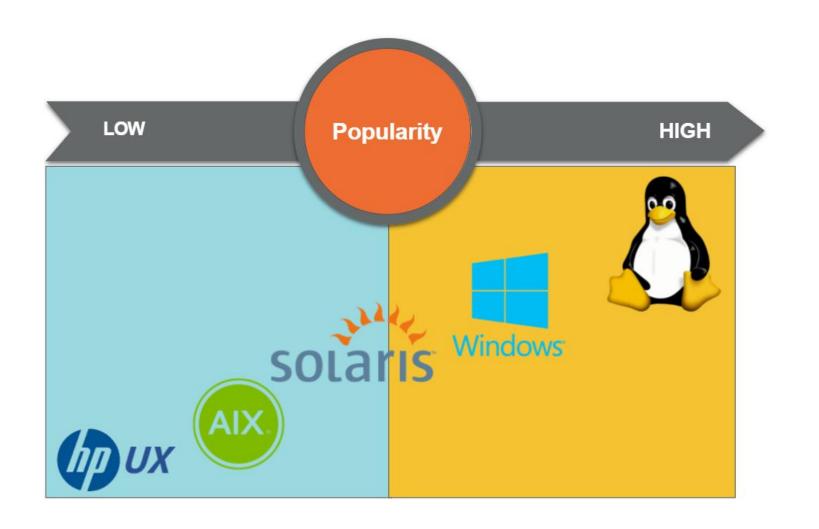Developers
View

The DBAs View

What is an Oracle DB?

Relational (RDBMS)

Object Oriented

XML/JSON

A Brief Oracle History

Oracle v1
1978

Oracle 8i
i = internet.
1999

2009 **Oracle 10g**
g = grid

Oracle 12c
c = cloud
2014

OS Platforms

FREE

Price

EXPENSIVE

Express Edition

- Limitations: 1 x CPU, 1GB RAM, 10GB storage
- No patches/support
- No JAVA
- Free

Standard Edition

- Limitations: no parallelism, no options (except for a RAC with limitations) and others
- A more resonable licensing model

Enterprise Edition

- No limitations (except for the separate options)
- Can install/use separate licensed options
- An insane price (per CPU)

Oracle Editions

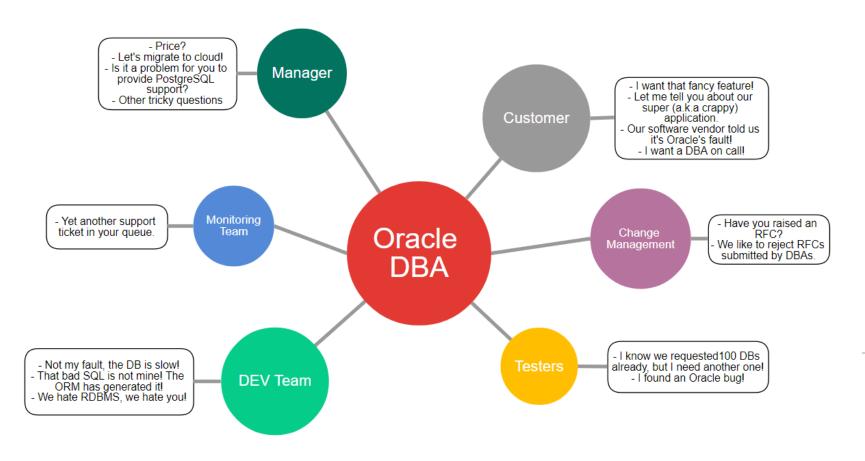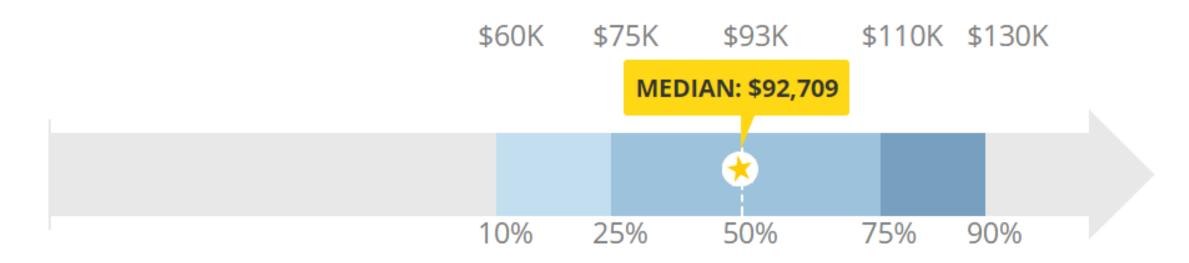| 01	02	03	04	05	06
Installing new Oracle servers	Upgrading DB	Secure the DB	Backup & Recovery	High availability setups	Other DB related tasks

The role of DBA

Social Interactions

Country: United States • Currency: USD • Updated: 27 Oct 2017 • Individuals Reporting: 733

$60K $75K $93K $110K $130K

MEDIAN: $92,709

10%   25%   50%   75%   90%

Oracle DBA Salaries

Source: https://www.payscale.com/research/US/Job=Oracle_Database_Administrator_(DBA)/Salary
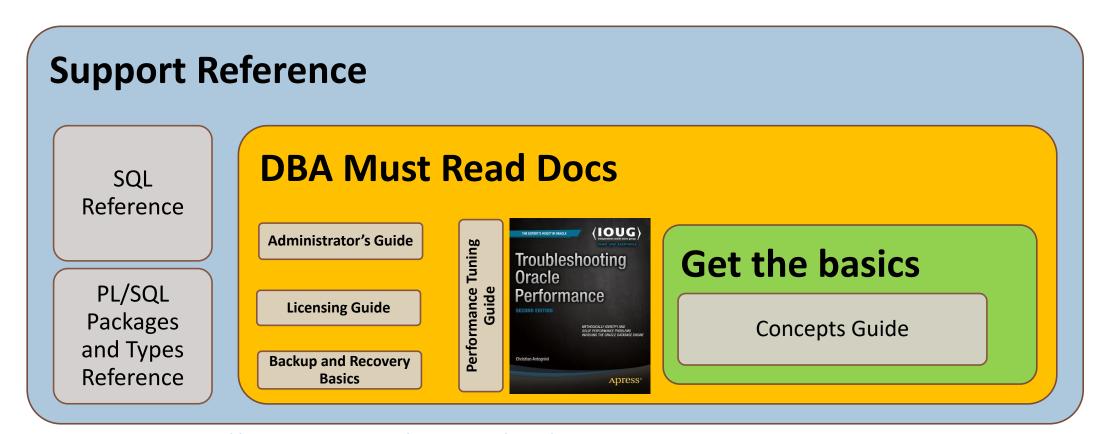
1 OCA Associate

3 OCM Master

CHEAP AFFORDABLE EXPENSIVE

2 OCP Professional

Oracle Certifications
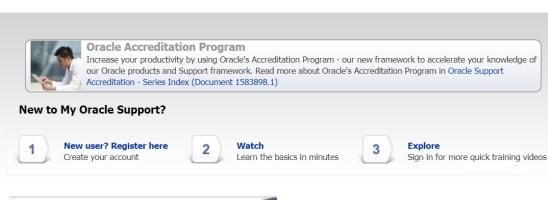
Junior Oracle DBA Documentation Roadmap

Support Reference

SQL Reference

PL/SQL Packages and Types Reference

DBA Must Read Docs

Administrator's Guide

Licensing Guide

Backup and Recovery Basics

Performance Tuning Guide

THE EXPERT'S VOICE® IN ORACLE

〈IOUG〉
Independent oracle users group
share your experience

Troubleshooting Oracle Performance

SECOND EDITION

METHODICALLY IDENTIFY AND SOLVE PERFORMANCE PROBLEMS INVOLVING THE ORACLE DATABASE ENGINE

Christian Antognini

Apress®

Get the basics

Concepts Guide

Bookmark it: https://docs.oracle.com/database/122/index.htm

Oracle Support

https://support.oracle.com

Basic Things You Need to Know

Data Size Conversions

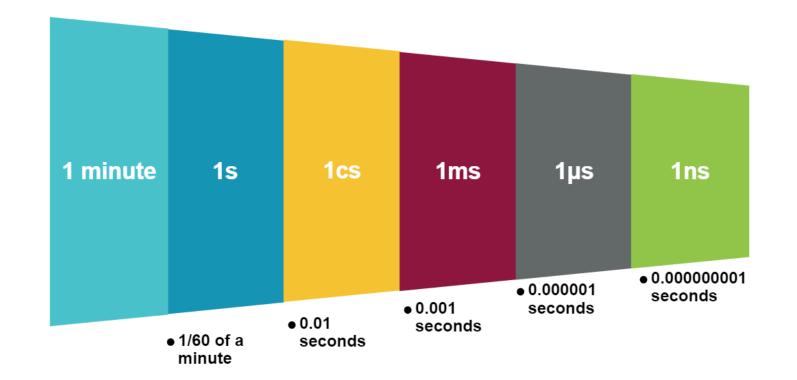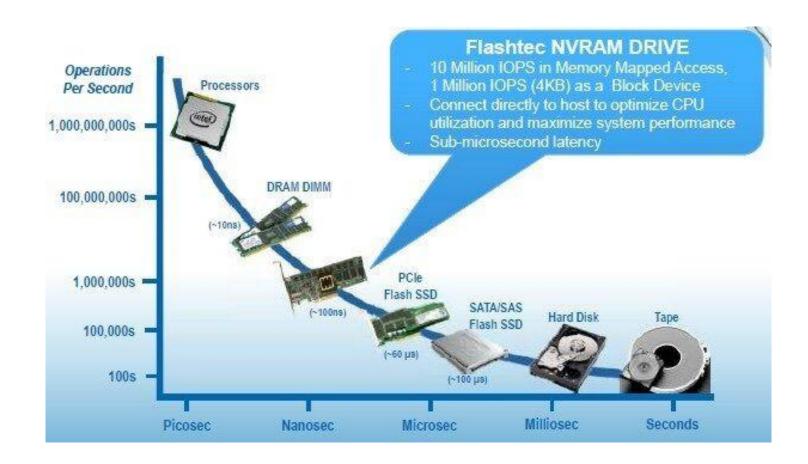1bit | 1 byte = 8bits | 1 KB = 1024 bytes | 1 MB = 1024 KB | 1 GB = 1024 MB | 1 TB = 1024 GB
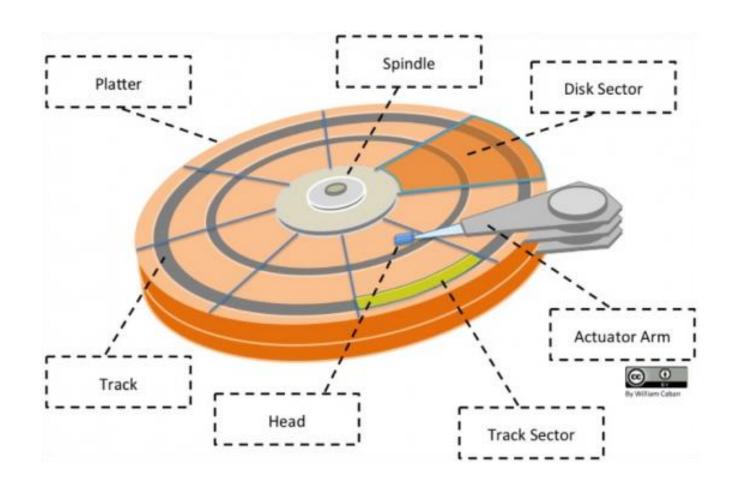
Devices Speed Comparison

Source: https://www.enterprisetech.com/2014/08/06/flashtec-nvram-15-million-iops-sub-microsecond-latency/

Latency vs Throughput

Source: https://alln-extcloud-storage.cisco.com/ciscoblogs/Blog6-550x360.png

Go to: https://goo.gl/hjjmNn

ZOHO Sheet

Online Excel Viewer

View your spreadsheets (.xlsx, .xls, .ods, .sxc, .csv, .tsv) online

○ Choose your File   ◉ Import from URL

https://goo.gl/R4ggrK   **View File**

Challenge

LATENCIES COMPARISON

Latencies Comparison Results

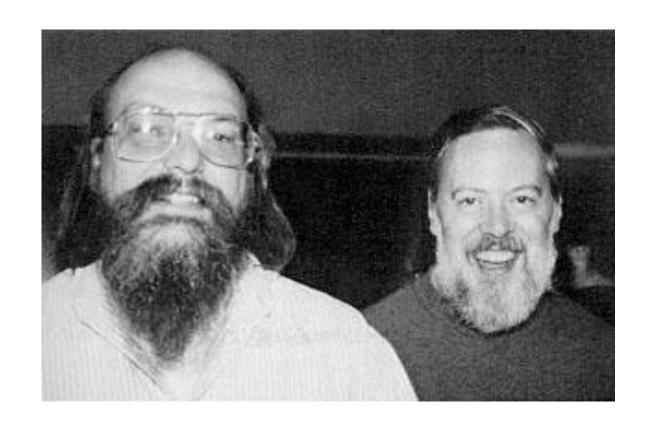| Event	Latency	Adjusted
1 CPU Cycle	0.3 ns	**1s**
L1 Cache	0.9 ns	**3s**
L2 Cache	2.8 ns	**9s**
L3 Cache	12.9 ns	**43s**
Main memory access (DRAM from CPU)	120 ns	**6min**
SSD disk IO (flash memory)	50-150 µs	**2-6days**
Rotational disk IO	1-10 ms	**1-12months**
Internet: San Francisco to New York	40 ms	**4years**
Internet: San Francisco to UK	81 ms	**8years**
TCP packet retransmit	1-3 s	**105-317years**

1ms = 0.001s

1µs = 0.000 001s

1ns = 0.000 000 001s

Basic Linux Administration

ARE YOU SCARED?

Source: https://goo.gl/iGrBqg

Linus Torvalds

In my opinion MS is a lot better at making money than it is at making good operating systems.

Microsoft isn't evil, they just make really crappy operating systems.

Source: https://www.youtube.com/watch?v=iYWzMvlj2RQ

The box said 'Requires Windows 95 or better'.

So I installed LINUX.

@UserOne / boldomatic.com

Oracle Enterprise Linux

Red Hat

SUSE

Asianux

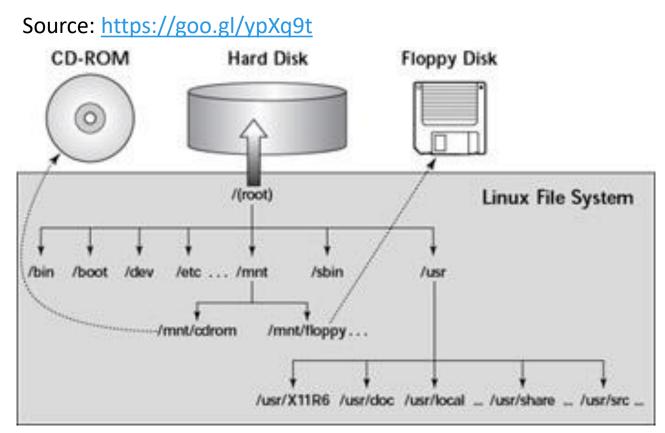Certified Linux Distributions for Oracle

Linux Online Playgrounds

https://bellard.org/jslinux/

http://www.masswerk.at/jsuix/

http://cb.vu/

http://www.webminal.org/ (free registration needed)
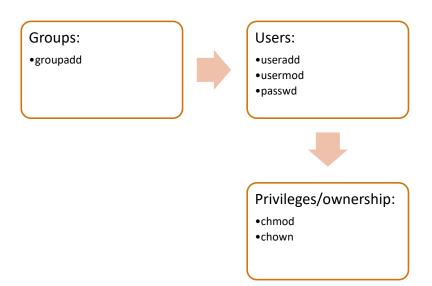
Task	Command
Go to path	`cd <folder>`
Create a new folder	`mkdir <folder>`
List files from a folder	`ls <folder>`
Copy/rename	`cp <src> <dest>` `mv <src> <dest>`
Partitions layout	`df -h`
The size of a folder	`du –sh <folder>`
Find a file	`find / -name <pattern>`

Get used to the filesystem

Users, Groups, Privileges
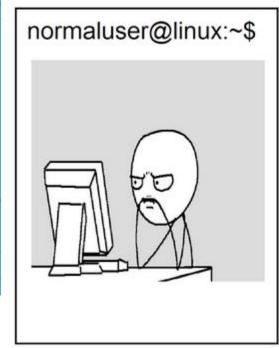
Source: https://goo.gl/UDE5vq

Groups:
- groupadd

Users:
- useradd
- usermod
- passwd

Privileges/ownership:
- chmod
- chown

The "root" User

Differences between:

normaluser@linux:~$

root@linux:~#
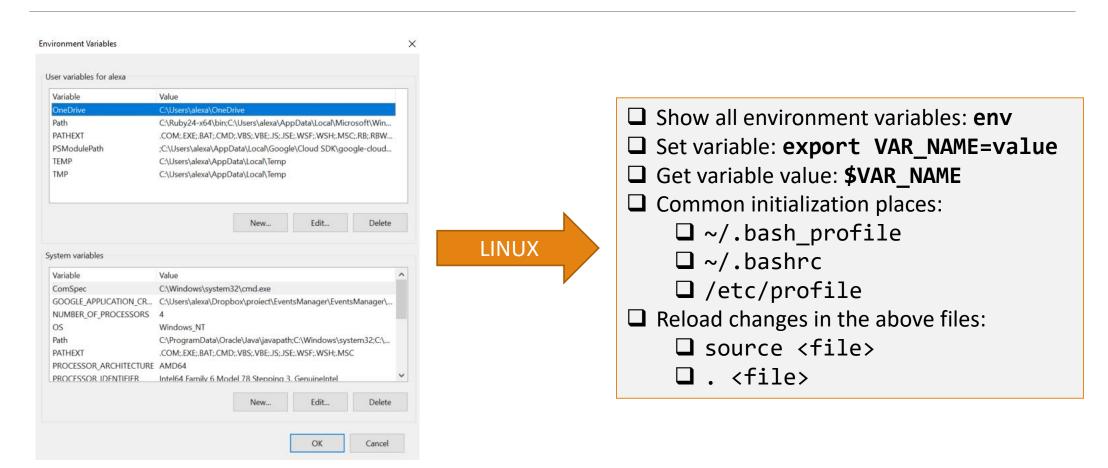
- ❑ "root" is required to install Oracle
- ❑ Use "su -" to switch to the "root" user
- ❑ Use "sudo <command>" to run something as root (similar to "Run as Administrator" in Windows)

Environment Variables

LINUX →

- ❑ Show all environment variables: **env**
- ❑ Set variable: **export VAR_NAME=value**
- ❑ Get variable value: **$VAR_NAME**
- ❑ Common initialization places:
  - ❑ **~/.bash_profile**
  - ❑ **~/.bashrc**
  - ❑ **/etc/profile**
- ❑ Reload changes in the above files:
  - ❑ **source <file>**
  - ❑ **. <file>**
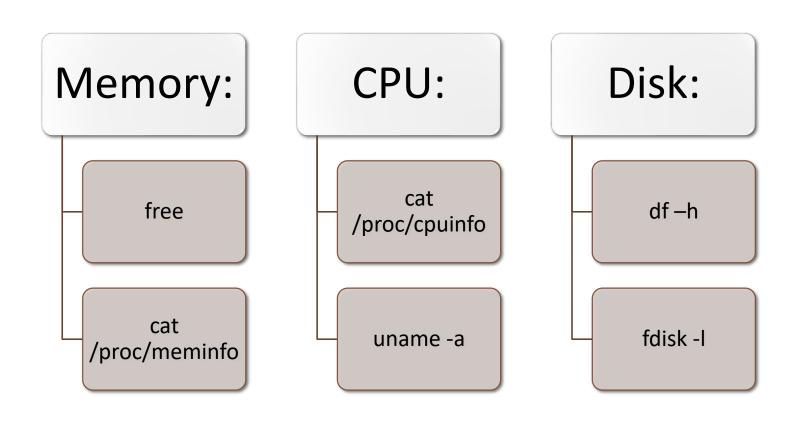
Basic I/O Redirection
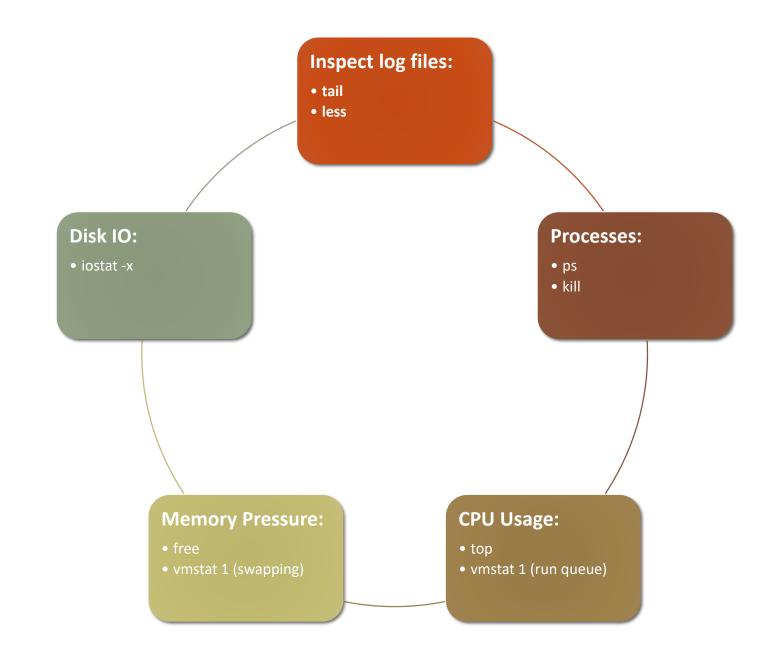
Symbol	Description
>	Directs the standard output to a file. If the file exists, it is overwritten.
>>	Append the standard output to a file. If the file exists, the output is appended, otherwise a new file is created.
2>	Directs just the standard error to a file.
&>	Directs both STDOUT and STDERR to a file.
<	Directs the content of a file to STDIN.
|	Directs the output of a command from the left as input to the command at the right.

System configuration

Memory:
- free
- cat /proc/meminfo

CPU:
- cat /proc/cpuinfo
- uname -a

Disk:
- df –h
- fdisk -l

Troubleshooting

Inspect log files:
- tail
- less

Processes:
- ps
- kill

CPU Usage:
- top
- vmstat 1 (run queue)

Memory Pressure:
- free
- vmstat 1 (swapping)

Disk IO:
- iostat -x

Edit Files with VIM

I Am Devloper
@iamdevloper
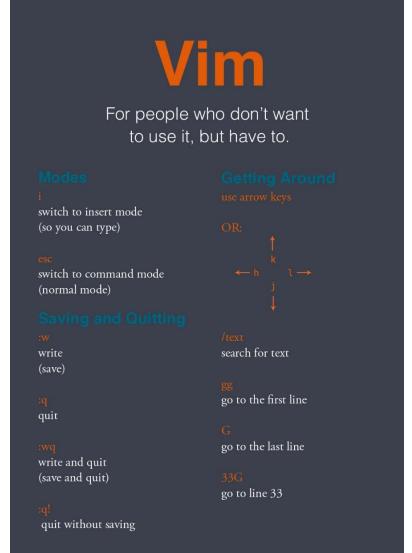
Follow

I've been using Vim for about 2 years now, mostly because I can't figure out how to exit it.

3:26 PM - 17 Feb 2014

Vim

For people who don't want to use it, but have to.

Modes

i
switch to insert mode
(so you can type)

esc
switch to command mode
(normal mode)

Saving and Quitting

:w
write
(save)

:q
quit

:wq
write and quit
(save and quit)

:q!
quit without saving

Getting Around

use arrow keys

OR:

↑
k
← h   l →
j
↓

/text
search for text

gg
go to the first line

G
go to the last line

33G
go to line 33

More Linux Help

Go to
https://bellard.org/jslinux/

Create the **/u01/playground** folder(s)

Go to the previous created "/u01/playground" folder.

Get the number of CPU cores available on the system

Create a new file in the "/u01/playground" folder called "**cpu_count.txt**" and write on the first line how many CPUs you have identified (nothing else)

Save the "**cpu_count.txt**" file and ensure that nobody else except for the "**root**" user can access this file (revoke read/write from group and others)
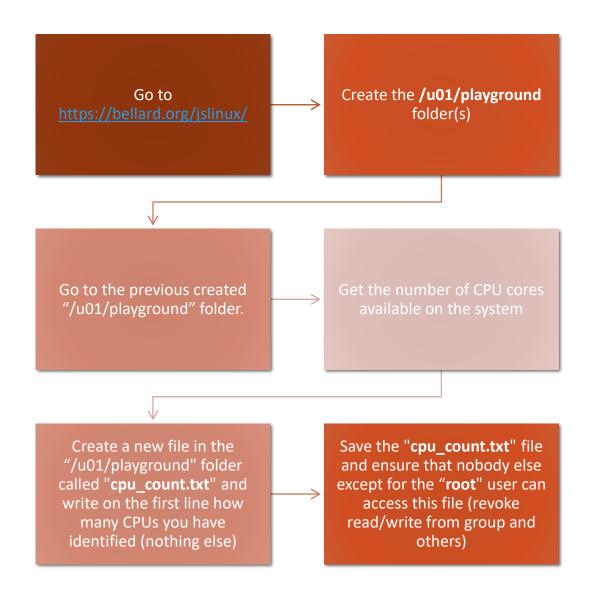
Linux Challenge

That's all for this week!

SEE YOU NEXT TIME!