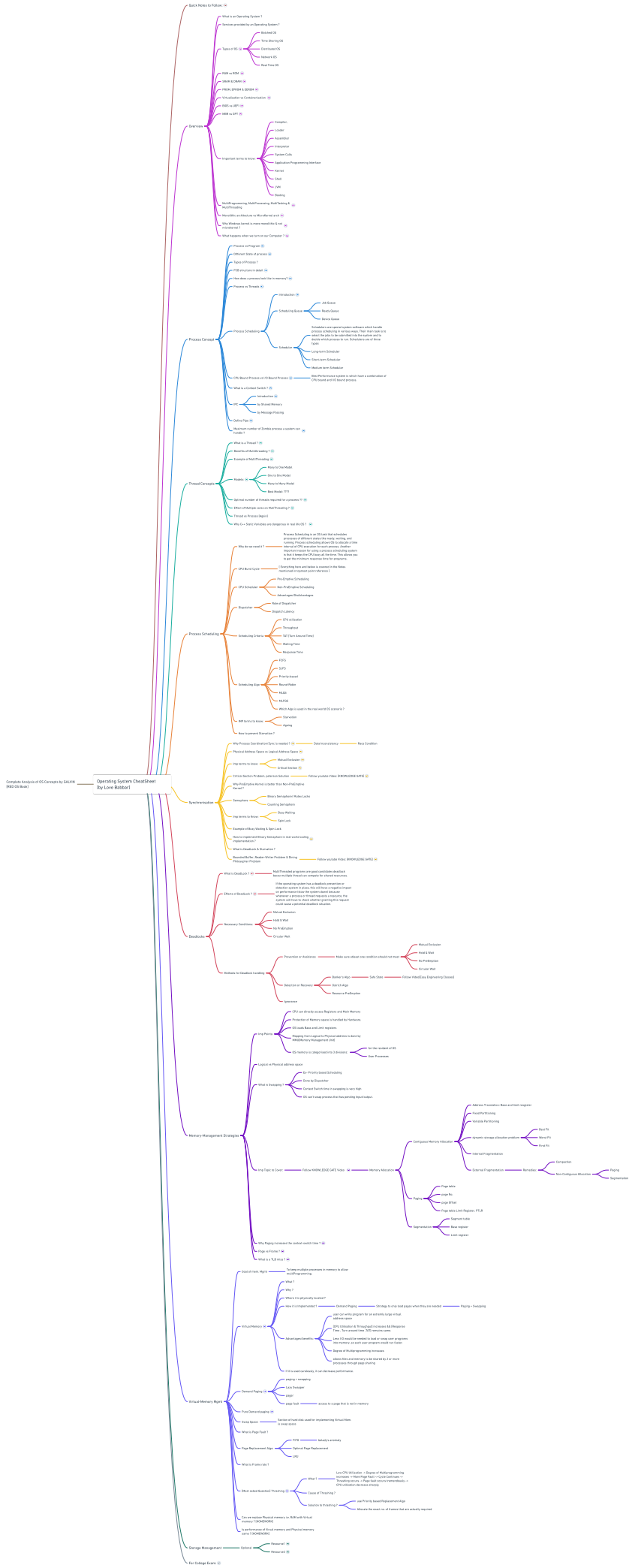
Complete Analysis of OS Concepts by GALAXY (NED OS Book)
Operating System CheatSheet [By Love Babbar]
Quick Notes to Follow:
Overview
What is an Operating System ?
Services provided by an Operating System ?
Types of OS
Batched OS
Time Sharing OS
Distributed OS
Network OS
Real Time OS
PROM vs ROM
SRAM & DRAM
EPROM, EEPROM & EEPROM
Virtualization vs Containerization
RAM vs ROM
RAM vs DRAM
Important terms to know
Compiler,
Loader
Assembler
Interpreter
System Calls
Application Programming Interface
Kernel
Shell
JVM
Booting
Multiprogramming, Multiprocessing, Multi Tasking & Multithreading
Monolithic architecture vs Microkernel arch
Why Windows kernel is more monolithic & not microkernel ?
What happens when we turn on our Computer ?
Process Concept
Process vs Program
Different State of process
Types of Process ?
PCB structure in detail
How does a process look like in memory ?
Process vs Threads
Process Scheduling
Introduction
Scheduling Queue
Job Queue
Ready Queue
Device Queue
Scheduler
Schedulers are special system software which handle process scheduling in various ways. Their main task is to select the jobs to be submitted into the system and to decide which process to run. Schedulers are of three types.
Long-term Scheduler
Short-term Scheduler
Medium term Scheduler
CPU Bound Process vs I/O Bound Process
Good Performance system is which have a combination of CPU bound and I/O bound process.
What is a Context Switch ?
IPC
Introduction
by Shared Memory
by Message Passing
Define Pipe
Maximum number of Zombie process a system can handle ?
Thread Concepts
What is a Thread ?
Benefits of Multithreading ?
Example of Multithreading
Models
Many to One Model
One to One Model
Many to Many Model
Best Model ????
Optimal number of threads required for a process ??
Effect of Multiple cores on Multi Threading ?
Thread vs Process [Again]
Why C++ Static Variables are dangerous in real life OS ?
Process Scheduling
Why do we need it ?
Process Scheduling is an OS task that schedules processes of different states like ready, waiting, and running. Process scheduling allows OS to allocate a time interval of CPU execution for each process. Another important reason for using a process scheduling system is that it keeps the CPU busy all the time and allows one to get the minimum response time for programs.
CPU Burst Cycle
[ Everything here and below is covered in the Notes mentioned in topmost point reference ]
CPU Scheduler
Pre-Emptive Scheduling
Non-PreEmptive Scheduling
Advantages/Disadvantages
Dispatcher
Role of Dispatcher
Dispatch Latency
Scheduling Criteria
CPU utilization
Throughput
TAT [Turn Around Time]
Waiting Time
Response Time
Scheduling Algo
FCFS
SJFS
Priority-based
Round Robin
MLQS
MLFQS
Which Algo is used in the real world OS scenario ?
IMP terms to know
Starvation
Ageing
How to prevent Starvation ?
Synchronization
Why Process Coordination/Sync is needed ?
Data Inconsistency
Race Condition
Physical Address Space vs Logical Address Space
Imp terms to know
Mutual Exclusion
Critical Section
Critical Section Problem, peterson Solution
Follow youtube Video: [KNOWLEDGE GATE]
Why PreEmptive Kernel is better than Non-PreEmptive Kernel ?
Semaphore
Binary Semaphore/ Mutex Locks
Counting Semaphore
Imp terms to Know
Busy Waiting
Spin Lock
Example of Busy Waiting & Spin-Lock
How to implement Binary Semaphore in real world coding implementation ?
What is Deadlock & Starvation ?
Bounded Buffer, Reader-Writer Problem & Dining Philosopher Problem
Follow youtube Video: [KNOWLEDGE GATE]
Deadlocks
What is Deadlock ?
Multi Threaded programs are good candidates deadlock hence multiple thread can compete for shared resources.
Effects of Deadlock ?
If the operating system has a deadlock prevention or detection system in place, this will have a negative impact on performance. Deadlock avoidance algorithms, whenever a process or thread requests a resource, the system will have to check whether granting this request could cause a potential deadlock situation.
Necessary Conditions
Mutual Exclusion
Hold & Wait
No Preemption
Circular Wait
Methods for Deadlock handling
Prevention or Avoidance
Make sure atleast one condition should not meet
Mutual Exclusion
Hold & Wait
No Preemption
Circular Wait
Detection or Recovery
Banker's Algo
Safe State
Follow [KnowLEDGE Engineering Classes]
Dijstrik Algo
Resource Preemption
Ignorance
Memory-Management Strategies
Imp Points
CPU can directly access Registers and Main Memory.
Protection of Memory space is handled by Hardware.
OS loads Base and Limit registers.
Mapping from Logical to Physical address is done by MMU[Memory Management Unit]
OS memory is categorised into 3 divisions
for the resident of OS.
User Processes.
Logical vs Physical address space
What is Swapping ?
Ex- Priority based Scheduling
Done by Dispatcher
Context Switch time in swapping is very high
OS can't swap process that has pending input/output.
Imp Topic to Cover:
Follow [KNOWLEDGE GATE Video]
Memory Allocation
Contiguous Memory Allocation
Address Translation, Base and limit register
Fixed Partitioning
Variable Partitioning
dynamic storage-allocation problem
First Fit
Best Fit
Worst Fit
Internal Fragmentation
External Fragmentation
Remedies
Compaction
Non-Contiguous Allocation
Paging
Segmentation
Paging
Page table
page No.
page Offset
Page table Limit Register, PTLR
Segmentation
Segment table
Base register
Limit register
Why Paging increases the context-switch time ?
Hit Ratio
Page vs Frame ?
What is a TLB miss ?
Virtual-Memory Mgmt
Goal of mem. Mgmt
To keep multiple processes in memory to allow multiprogramming.
Virtual Memory
What ?
Why ?
Where it is physically located ?
How it is implemented ?
Demand Paging
Strategy to only load pages when they are needed
Paging + Swapping
Advantages/benefits
user can write program for an extremly large virtual address space.
CPU Utilisation & Throughput increases && [Response Time , Turn around time , TAT] remains same.
Less I/O would be needed to load or swap over programs into memory, so each user program would run faster.
Degree of Multiprogramming increases.
allows files and memory to be shared by 2 or more processes through page sharing
It is used carelessly, it can decrease performance.
Demand Paging
paging + swapping
Lazy Swapper
pager
page fault
access to a page that is not in memory
Pure Demand paging
Swap Space
Section of hard disk used for implementing Virtual Mem. is swap space
What is Page Fault ?
Page Replacement Algo
FIFO
Belady's anomaly
Optimal Page Replacement
LRU
What is Frame rate ?
Most Asked Question Threshing
What ?
Low CPU Utilisation -> Degree of Multiprogramming Increases -> More Page Fault -> Cycle Continues -> Threshing occurs -> Page fault occurs tremendously -> CPU utilisation decreases sharply
Cause of Threshing ?
Solution to threshing ?
use Priority based Replacement Algo
Allocate the exact no. of frames that are actually required
Can we replace Physical memory i.e. RAM with Virtual memory ? [IMPORTANT]
Is performance of Virtual memory and Physical memory same ? [IMPORTANT]
Storage Management
Optional
Resource1
Resource2
For College Exams