OS Concepts – Questions and Links

General - Questions

1. What do you understand by System Calls? How System Call Works? How the context switching is related to System call?
2. How to add new system call into the Kernel? What are the various steps involved?
3. Explain Linux Booting Process? Why do you need X-Loader?
4. What is difference between GPOS (General Purpose Operating System) and Special Purpose Operating System such as RTOS?
5. How crash is different from panic?
6. How user space is different from kernel space?
7. What are the main modules to implement OS Kernel Functionalities?
8. What are the different types of Kernels?
9. How Kernel is different from OS?
10. How to allocate memory from Kernel Space?
11. Explain about Linux Boot Loaders viz., LILO, GRUB
12. Check with compgen –c command.

Memory Management - Questions

1. What is meant by Paging?
2. What is meant by Segmentation?
3. Explain Internal and External Fragmentations?
4. Explain page fault? Also about bits such as modified flag or bit, dirty bit etc.
5. What is Virtual Memory and what it is used for?
6. What is Physical Memory?
7. What is meant by Demand Paging in OS?
8. Describe virtual address translation mechanism.
9. Difference between swap in/out and page in/out
10. Explain about kernel memory allocation and buddy system
11. What is meant by thrashing?
12. What you understood from /proc/slabinfo and slabtop commands?
13. Write program to get resource limits using getrlimit() system call and analyze the resource limits. Check with all resource limits available.
14. What are the differences between kmalloc() and vmalloc() functions?
15. Do some analysis on vmstat with options –s, -a, -f, -m (need to be su for this), -n etc (-h gives all details)

```
#include <stdio.h>
#include <stdlib.h>
extern int etext, edata, end;
int main(){
	printf("Addr etext: %p\t", &etext);
	printf("Addr edata: %p\t", &edata);
	printf("Addr end: %p\n", &end);

	char *s1 = "hello"; //in initialized data segment
	static int v1=1; //in initialized data segment
	static int v2; //in uninitialized data segment
	char s2[] = "hello"; //in the stack area.
	int * dynmem = malloc(4);

	printf("Initialized Data Segment %p\n", s1);
	printf("Initialized Data Segment %p\n", &v1);
	printf("Uninitialized Data Segment %p\n", &v1);
	printf("Stack Area%p\n", s2);
	printf("DMA %p\n", dynmem);
	return 0;
}
```

File System Management - Questions

1. What are different types of files available? What are generic file operations? What are I/O related system calls?
2. How do you create special files like named pipes and device files?
3. What do you understand by VFS? Not simple abbreviation, provide the basic understanding.
4. What do you understand by VNODE? How it is different from inode?
5. What is meant by file system? What are the different file systems supported in Linux?
6. What is swap partition?
7. What is use of the commands df –T, mount, file, fsck? Also what is the purpose of /etc/fstab?
8. The file system contains boot block, super block, inode table and data blocks. Explain this in more detail?
9. Assuming total 15 blocks out of which 12 are direct and 3 are indirect (single, double, triple), block size is 4k, Can you calculate how much maximum size of file you can store?
10. Explain about ext2, ext3 and ext4 file systems using in Linux?
11. What is the use of /etc/mtab file and sysctl command?

Process Sub-System Management - Questions

1. What are the process states available in this process management sub-system?
2. What is the first process in the Kernel? What is the purpose of this process?
3. What are different types of OS scheduling algorithms available?
4. What is process kernel stack and process user stack? What is the size of each and how they are allocated?
5. Why do we need separate kernel stack for each process?
6. List the system calls used for process management.
7. What happens when you execute a program and when you execute a command?
8. What do you understand by short term scheduler and long term scheduler?
9. What do you understand by PROC file system? Also, what are the commands related to process management system.
10. What do you understand by various processes zombie, orphan and daemon processes? What are the usual daemon (Disk and Execution Monitor) processes in the system?
11. What do you understand by terms context switching, pre-emptive scheduling and non-preemptive scheduling?
12. What is time slice? Explain PCB?

Device Management - Questions

1. What is the purpose of DMA (Direct Memory Access)?
2. What happens when interrupt is raised by any Device? Explain interrupt handling mechanism in Linux?
3. Why is interrupt vector used in OS? What is the need of device status table?
4. Explain the positioning time for a disk (seek time, latency time)
5. Explain the terms buses, devices and drivers
6. Analyze /dev directory and various character and block special files under /dev
7. What do you understand by mount points?
8. Check with information from /proc file system files viz., devices, partitions, interrupts, mounts, iomem, swaps, diskstats, softirqs, devices (under /proc/bus/input).
9. Work on I/O control (ioctl()) in Linux

Network Management - Questions

1. Explain OSI reference Layer/Model
2. What is TCP/IP model of networking and what is UDP/IP model of networking? Also note the differences between them.
3. How OSI is different from 4 layer TCP/IP model
4. What are different networking protocols?
5. Why do we have MAC and IP addresses?
6. What are different types of topologies viz., bus, ring, star, mesh
7. What is meant by socket?
8. Explain TCP and UDP headers
9. Explain the purpose of CRC/checksum
10. Work on the network commands netstat, net,

Device Driver - Questions

1. How many ways of integrating module to Kernel?
2. How to insert module during run time?
3. What do the commands insmod, lsmod, modinfo, modprobe, rmmod perform?
4. What is meant by ISR? Why ISR's are needed for Device Drivers?
5. What is meant by IPL's?
6. What are generic driver entry points?
7. What are the types of device drivers available?
8. How character driver is different from block device driver?
9. What is need of top half and bottom half routines (or upper half and lower half)?
10. What are the different types of bottom half routines are available and what is their purpose?
11. What would copy_from_user() and copy_to_user() functions perform?
12. What are the differences between SoftIRQ and Tasklets?

Building Kernel Image - Questions

1. What is meant by cross-compilation? How it is different from general compilation?
2. How to communicate to target board, what are the different ways available?
3. Explain the process of building kernel Image (from kernel.org) with the detailed steps.
4. Work on the building Kernel Image with YOCTO

ARM - Questions

1. Explain ARM architecture?
2. Explain differences between CISC and RISC
3. Explain different modes in ARM?
4. Explain pipelining in ARM?
5. Explain Linux boot sequence in case of ARM architecture?

OS

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8. https://www.tecmint.com/linux-file-system-explained/
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10. http://www.thegeekstuff.com/2011/04/identify-file-system-type/
11. https://web.cs.wpi.edu/~rek/DCS/D04/UnixFileSystems.html
12. http://www.tldp.org/LDP/intro-linux/html/sect_03_01.html

Process Management

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Device Management

Network Management

Device Driver

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