

Explain linking with example.

process of combining various pieces of code & data together to form a single executable program. This process usually involves combination of multiple object files generated by compiler or possibly some libraries into single executable file. Example.

Suppose you have two C files, main.c and helper.c.

① main.c

```
#include <stdio.h>
void helperFunction();
int main() {
    printf("Hello from main");
    helperFunction();
    return 0;
}
```

}

② helper.c

```
#include <stdio.h>
void helperFunction() {
    printf("Hello from helper!");
}
```

}

When compiled, compiler generated object files. linker's job is to take these object files (main.o and helper.o) & combines them into single executable file. During linking, linker resolve references bet<sup>n</sup> object file.

- Advantage:

- ① No external dependencies.

- ② smaller executable file.

- Disadvantage:

- ① larger executable file. if library has bug

- ② Require correct version of library at Runtime

Q.2 Explain loading with example.

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loading Refers to process of bringing an executable program into memory so that it can be Run by operating system.

This involve Reading program's binary file from storage into computation RAM and then preparing it for computers by CPU from the above program.

- ① executable file my program is created. this file is stored on hard drive.

- ② loading processes when you Run file from Command line following steps occur

- Advantage

- ① simple

- ② faster.

Disadvantage:

- ① time Required.

Q.3 What are advantage of dynamic linking library?  
5/10

Advantages:

- ① Memory and Disk space Efficiency:  
shared code bet<sup>r</sup> programs Reduces memory and storage usage.
- ② Modularity and Reusability:  
Easier to update to Replace parts of a program Without Recompiling everything
- ③ simplified update:  
Fixes and patches can be Applied by updating just the DLL.
- ④ Faster load times:  
only necessary components are loaded When needed.
- ⑤ language interoperability:  
Allows integration of code different language

Q.4) What are advantages and disadvantages of static linking library.

5/10

Advantage:-

① self contained executable:  
No external dependencies, ensuring  
program runs on any system.

② Improve performance:  
No runtime overhead leading to faster  
startup and execution.

③ Increased Reliability:  
consistent behaviour across system  
unaffected by external library version

Disadvantage:

① larger Executable size:  
Increased disks and memory usage.

② Less efficient memory use:  
No sharing of code across programs  
leading to Redundancy.

③ compatibility Issue:  
potential problem across different  
platform or environment