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Que = * processor, memory, HCI, input-output device

* processor:
- A processor is the logic circuitry that responds to and processes the basic instruction that drive a computer.

→ basic elements of processor:
1. ALU (Arithmetic logic unit)
2. FPU (Floting point unit)
3. Registers

* Memory:
- Memory is the faculty of the brain by which information is encoded, stored and retrived when needed.

→ types of memory:
1. secondary memory (Hard drive, ← 2. non-volatile)
2. short-term memory
3. long-term memory
4. working memory (1. volatile = RAM)

* HCI (human computer interaction)
- HCI is multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between human and computers.

(i) The character user interface OS (CUI)
- the cui os is text-based os, which is used for interacting with the software or files by typing commands to perform specific tasks.
- It include DOS and UNIX.

(ii) Graphical user Interface OS (GUI)
- The Graphical mode interface os is a mouse-base os (windows os, LINUX) where in a user performs the tasks or operation without typing the commands from keyboard.

(2) Real-time operating system
- Real-time os are also known as multitasking os. the Normal os is responsible for managing the hardware resources of computer.
- real-time os is designed for real time application, such as embedded systems, industrial robots, scientific research equipment and others.

1. soft-real-time os
2. hard real time os

(i) hard-real-time system :
- the hard real time system is a purely time constant system.

(ii) soft real-time system :
- soft real-time system, meeting the deadline is not mandatory for every task. therefore a soft real time system can miss the deadline by one or two seconds.

* example of RT os :
- RTLinux
- Vx works
- TRON
- Windows CE.

Que different types of operating system :
1. real-time
2. Multi-user Vs single-user
3. Multi-tasking vs single tasking
4. Distributed
5. Embedded.

(1) Real-time :
A real time os is multitasking os that aims at executing real time application
- Responds to input instantly

2. Multi-user Vs
- Multi-user os allows multiple user to access a computer system concurrently
- time-sharing system can be classified as multi-user systems as they enable a multiple user access to a computer through the sharing of time.
- single-user os as opposed to a multi user os, are usable by a single user at a time

3. Multi-tasking Vs single-tasking
- when a single program is allowed to run at a time the system is grouped under a single-tasking system.
- while in case the os allows the execution tisks at one time it is classified as a multi-tasking os.

4. Distributed :
- A distributed os manages a group of independent computers and makes them appear to be a single computer.
- the development of networked computers that could be linked and communicate with each other gave rise to distributed computing.

5. embedded :
- embedded os are designed to be used in embedded computer systems.
- they are designed to operate on small machines like PDAs with less autonomy.
- they are able to operate with a limited number of resources.

* Serial and sequncial os:
→ the serial processing os are those which Performs all the instruction into sequence Manner or the instructions those are given by the user will be executed by using the FIFO manner means First in first out.

* Multiprogramming :
→ Multiprograming is a rudimentary from of pyrallel processing in which several programs are run at the same time on a uniprocesor.

* Multiprocessing :
→ Multiprocessing is the use of two or more central processing units (CPU) within a single computer system.

outline operating system

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* Network :
- these system provids the functionality to manage data, user, application, security, groups and also some other networking roles.
- this allow shared access to networking function on minor or small private Network.

* Batch :
- there is an individual operators which takes similar kind of jobs having the same needs and requirements and then group them into different batches

* time-sharing OS :
- some time is given to each task to execute or get implemented so that each tasks is able to work smoothly. each and every user occupies the time of CPU. as they use a single system.

que :- 1. What is file ?
2. different types of file.
3. List out OS services.
- operation of the file.

ch = 2

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* What is file ?
→ file are developing an application program. A program, which we prepare, is a file.
- We may compile this program file and get an object code or an executable. the executable is also a file.
- The output from a compiler may be an object code file are an executable file.
1 mark Irrespective of the content any organised information is a file.

* different types of file : → regular file, directly file

File type	extension	function
object	obj, o	compiled machine language not linked.
source-code	c, java, pas, asm, a	source code in various languages
Batch	bat, sh	commands to the command interpreter.
text	txt, doc	textual data, documents.

Word-processor	wp, tex, rtf, doc	word processor formats. Related file.
Archive	arc, zip, tar	grouped into one compressed file.
Multimedia	mpeg, MOV, rm	containing audio, video information

* List out the operating service :

1. user interface
2. program execution
3. file system manipulation
4. input / output operations.
5. communication
6. Resource Allocation
7. Error Detection
8. Accounting
9. security and protection

→ operation of the files :

"file are used to stored the required

seelbards

information for its later uses.

- there are many file operations that can be perform by the computer system.

→ opertion on some common file :

1. file create operation
2. file delete operation
3. file open operation
4. file close operation
5. File read operation
6. file write operation
7. File Append operation
8. File seek operation
9. File get attribute operation
10. File set attribute operation
11. File rename operation
12. bit operation

* file structure :

* file ?

→ irrespective of the content, any organized information is a file,

e.g - a telephone number
- web image.

* File system:
is that software which allows users and applications to organize their files.

NONE = list files
-l = long lists file, access permision
ls-d = directory, list
-a = lists all files including all
-6 =

	read	write	execute	
Temp → file name	rwx	rwx	rwx	permision
chmod =	owner	group	other	
	111	111	111	
	7	7	7	
	rwx	rw-	r--	
	111	110	100	
	7	6	4	

⇒ File 010 110 100
2 6 4

chmod = -gw File
chmod = +gx file permision group
group execute

* write a command for UNIX OS to set permision for user has write permision, group has read and write permision and other has execute permision on file "file2"

→ file name
→ chmod = 261 file2

-w-	rw-	--x
010	110	001
user	group	others

* what is file descriptor ?
→ is the value containg information necessary to use a file : a pointer to the file, the access rights, the access modes (read/ write), the current position in the file etc.
- A file descriptor is kept within the file structure and is often used by the file system software to help OS provides Managment services.

* File Atributes :
1. location at which file available on disk
2. size of file
3. when created, i.e date and time of creation.

4. owner of the file
5. access permissions on file (i.e. read, write, execute)

→ file find કરવા માટે : "split"

1. dir m* (કોઈ પણ length) ની ફાઈલ મળે m નામ વાળી

2. dir m????

5 length ની file m થી start થાય
? → 1 character represent કરે.

(iv) command unix's :

-a list hidden file
-d list the name of the current directory
-g show group ownership of file in long listing
-i print the inode number of each file.
-l long listing giving details about files and directories.

* Unix provides Crypt command to encrypt files.

syntax

Crypt Encrypt key <input File> output File.

* Information Required for file Management :

Nature of information	Its significance	Its use in management
File name	chosen by its creator user or program.	To check its uniquess within a directory
File type	text, binary, program etc.	to check its correct usage
Date of creation & last usage	time and date	useful for recording identity of user also
Permission	rwx info	controls read, write, execute, useful for Network access.
starting address	physical mapping	useful for access
size	user must allocate within allocated space.	Interna allocation of disc blocks

difference between IMP

* execution of instruction or programm is called process. (primary memory)
* set of instruction is program (secondary memory)

current usage	time and date	identity
file structure	useful in date manipulation	to check its usage.

Que * explain root file system.

⇒ The root file system is the file system contained on the same disk partition on which the root directory is located; it is the filesystem on top of which all other file systems are mounted as the system boots up.

- In a computer file system and primarily used in the Unix and Unix like OS, the root directory is the first or top-most directory in a hierarchy.

⇒ All files are kept in subdirectories under the root filesystem :

IMP

1. /bin
   - commands needed during bootup that might be used by normal users.
   - executable file

root symbol

2. /sbin
   - /sbin is not usually in the default path of normal users, but will be in root's default's path.
3. /etc
   - configuration file specific to the machine.
4. /root
   - The home directory for user root.
5. /lib / modules
   - loadable kernel modules, especially those that are needed to boot the system when recovering from disasters
6. /dev
   - Device files : interface with various devices on system
7. /tmp - temporary files.
8. /boot - Files are used by the bootstrap loader.
9. /mnt - mount point for temporary mounts by the system administrator.
10. /proc, /usr, /var, /home.
    - Mount points for the other filesystems.

ctrl + Alt + delete.

ZMP
5-states

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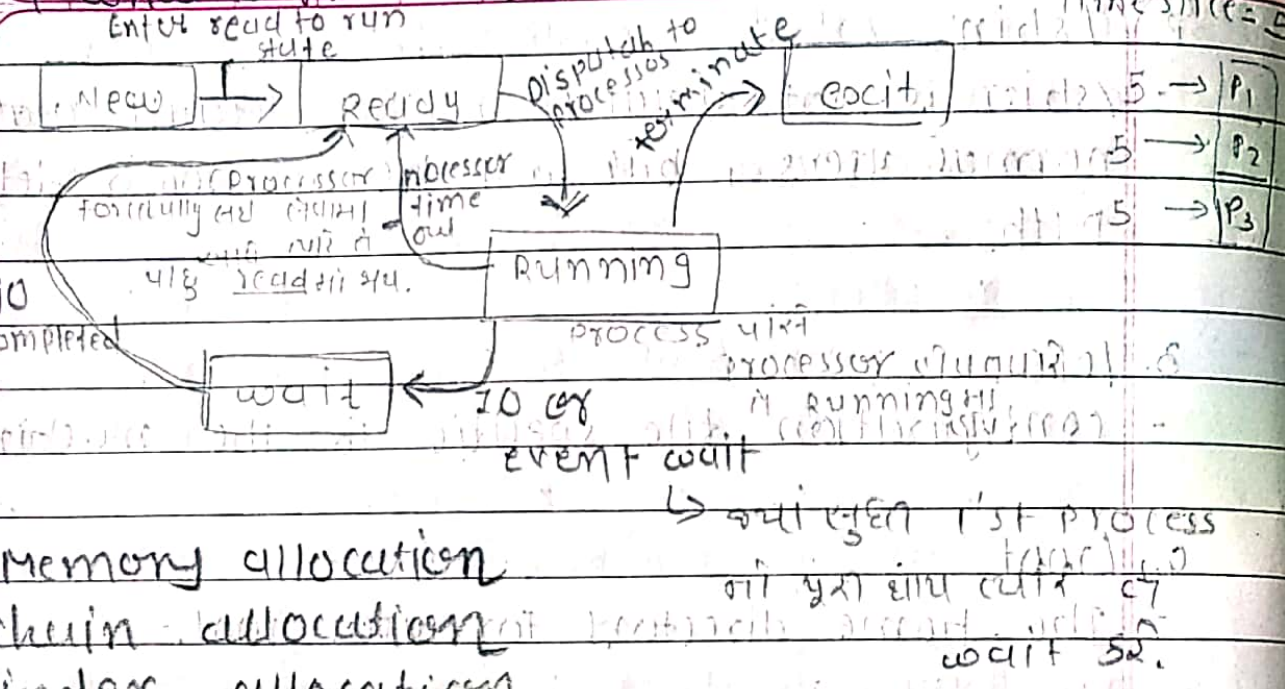
* what is process ? and it's 5 statues ?



ZMP
(1) Memory allocation
(2) chain allocation
(3) index allocation

que = internal fragmentation and external fragmentation.

* File storage Management :

→ An OS needs to maintain several pieces of information for file management

esc access & modification time of file

- Audit trail gives who accessed which file and did what.

- In Unix, these trails are maintained in the syslog file.

PCB = Process control Block.
FCB = File " ".

reintroduce

File size	Expressed in No. of bytes.
File address	39 bytes of addressing information.
last access to file	Date and time of last access.
last modified	Date and time of last modification.
last inode Modification	Date and time of last inode modification.

* file control blocks:
* soft link and hard link.
* absolut path
* Relative path

definition

* soft link:
- soft link is usally an alternative path for the original file; these are also referred to as symbolic links.

* Hard link:
- Hard link directly link two files in the same file system and for identification it uses files inode number.
- Hard link can't be implemented on directories.

* absolut path:
- absolut path is a complete path from start of actual file system from / directory.

child

* Relative path:
- Relative path is defined as the path related to the present working directly (pwd)
- starts at your current directory and Never starts with a/.

* internal fragmentation:
- It is the wasted space within each allocated block because of rounding up from the actual requested allocation to the allocation granularity.

* External fragmentation:
- It is the various free spaced holes that are generated in either your memory or disk space.

- External fragmentation blocks are available for allocation, but may be too small to be of any use.

M.I.M.P

* Multi-programming supports in OS :
P_1 execution चालू था तो P_2 wait में था.

→ Disadvantage:
overhead faced while swithching the context of use of the processor.

→ Advantage - computer resource utilization is improved.
- Memory utilization is improved with multiple processes residing in main memory.
- A system would give maximum throughput when all its componets are busy all the time.

que = definition

* CPU Utilization
* waiting time
* turnaround time
* response time
* throughput

scheduling Criteria (JMP)

* CPU Utilization : (Maximum)
→ CPU utilization is the sum of work handled by a central processing unit.
it is also used to estimate system performance
- CPU utilization can vary according to the type and amount of computing task because some tasks require heavy CPU time while others require less CPU time

* waiting time : (Minimum) → difference between turnaround and wait.
→ A waiting time is the time it takes for a patient to receive treatment after being registered to X
{ How much time processes spend in the ready queue waiting their turn to get on the CPU.

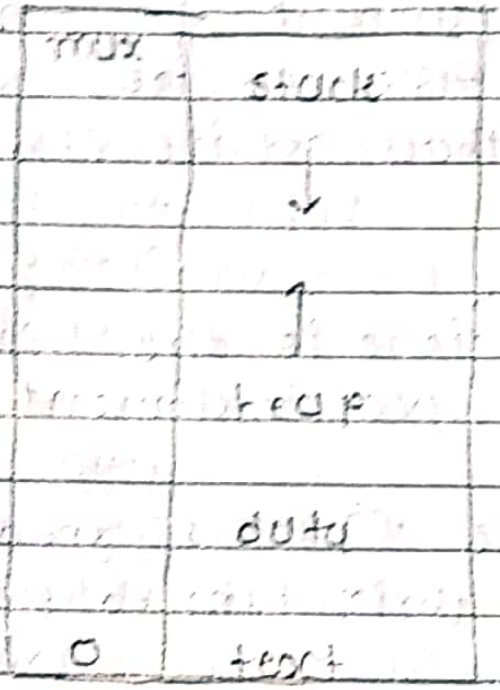
* turnaround time : (Minimum)
time required for a particular process to complete, form submission time to completion (wall clock time)

* Response time : (Minimum)
The time taken in an interactive program from the issuance of a command to the commence of a responce to that command.
(last input, first output)
time of the submission for the

Scanned by CamScanner

throughput (maximum)
number of process completed per unit time may range from 10/second to 1/hour depending on the specific process.

diagram of process



Process control block (PCB)
information associated with each process

1. Process state
2. Program counter
3. CPU registers
4. CPU scheduling information
5. Memory-Management information
6. Accounting information
7. I/O status information

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* Maximum CPU utilization obtained with multiprograming :

CPU free ના રેવુ જોઈએ
CPU busy હોય ત્યારે તે utilization વધે.

Multiprograming થી CPU ને process assign થાય ત્યારે CPU utilization વધે.

* CPU brust distribution.

* CPU - I/O burst cycle - Process execution consist of I/O ⇒ CPU સતત busy હોય.

* CPU sheduler :

Selects from among the processes in memory that are redy to execute, and allocated the CPU to one of them.

→ CPU sheduling decision may take place when a process :

1. switching from running to waiting state (I/O device)
2. " " runing to ready
3. " " waiting to ready
4. Terminates. (બધો processor release કરે)

1 & 4 ⇒ NON-Preemtive or cooperative
2 & 3 ⇒ Preemtive (forcefully લઈ લેવામાં આવે તો)

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* Under nonpreemptive scheduling once the CPU has been allocated to a process, the process keeps the CPU until it releases the CPU either by terminating or by switching to the waiting state.

* Dispatcher : → જ્યારે P1 અધુરી હોય અને ફરીથી ત્યાંથી process શરૂ કરવા હોય ત્યારે Dispatcher use થાય. (PCB)

module gives control to the CPU to the process selected by the short-term sheduler.

this involes :

1. switching context
2. switching to user mode
3. jumping to the proper location in the user program to restart that program.

* Dispatch latency :

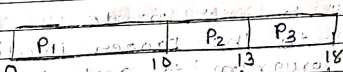
the time it takes for the dispatcher for stop one process and start another running.

(NON-preemptive) (FCFS)

First come First serve Algorithm:

Process	Burst time	waiting time	Turnaround time
P_1	10	0	10
P_2	3	10-0 = 10	13
P_3	5	13	18

⟹ Gantt chart



⟹ Average waiting time = $\frac{0+10+13}{3}$

= 7.4 m/s milli second

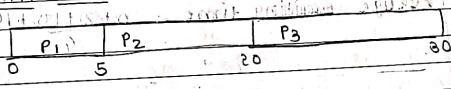
⟹ average-
Turnaround time = $\frac{10+13+18}{3}$

= 13.66 m/s

Process P_1, P_2, P_3, brust time 5, 15, 10 all the process are arrive in main memory at 0 m/s in the sequence of P_1, P_2, P_3 find out Average waiting time and Average turnaround time for FCFS (First come First serve) Algom.

Process	Brust time	waiting time	turnaround time
P_1	5	0	5
P_2	15	5	20
P_3	10	20	30

⟹ Gantt chart



⟹ average waiting time = $\frac{0+5+20}{3}$

= 8.33 m/s

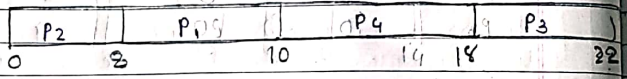
⟹ average-
Turn around time = $\frac{5+20+30}{3}$

= 18.33 m/s

arrival at 0 ms to seqyce of P2, P1, P4, P3.

Process	Brust time	waiting time	turnaroud time
P2	8	0	2
P1	2	8	10
P4	10	10	18
P3	4	18	22

⟹ gantt chart :



⟹ Average waiting time = $\frac{0+2+10+14}{4}$

=

⟹ Average turnaroud time = $\frac{2+10+14+22}{4}$

P1 → 23
P2 → 11
P3 → 7
P4 → 9
P5 → 13

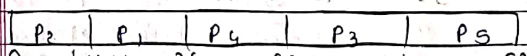
sequence = P2 ↓ P1 ↓ P3 ↓ P4 ↓ P5 ↓

11 23 7 9 13

(718)

P1, P2, P3, P4, P5, time 23, 11, 7, 9, 13
Find Average and trun around time.
sequence = P2, P1, P4, P3, P5.

Process	Brust time	waiting time	turnaroud time
P2	11	0	11
P1	23	11	34
P4	9	34	43
P3	7	43	50
P5	13	50	63



⟹ avarge waiting time = $\frac{0+11+34+43+50}{5}$

= 27.6 ms

⟹ Average turnaroud time = $\frac{11+34+43+50+63}{5}$

= 40.2 ms.

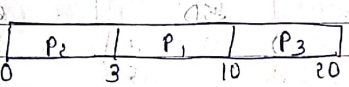
(SJF)

→ જેનો burst time નાનો હોય તેને પહેલા લેવો.

Shortest Job First Algorithm

Process	Brust-time	waiting time	Turn-around time
P_1	3	0	3
P_2	7	3	10
P_3	10	10	20

(arrival time બધાનો સરખો.)



→ Avrage waiting time = $\frac{0+3+10}{3}$ = 4.33 ms

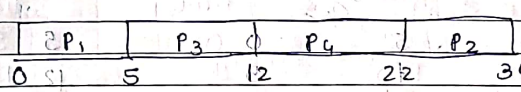
→ Average Turn around time = $\frac{3+10+20}{3}$

= 11 ms.

P :- P_1, P_2, P_3, P_4 } average waiting time of SJF.

time = 5, 12, 7, 10

process	times	waiting	turn around
P_1	5	0	5
P_3	7	5	12
P_4	10	12	22
P_2	12	22	34



→ average waiting time = $\frac{0+5+12+22}{4}$

= 9.75 ms.

→ avrage turnaroud time = $\frac{5+12+22+34}{4}$

= 14.6 ms

5 Marks

Process	Brust time
P_1	5
P_2	7
P_3	9
P_4	7

Find FCFS and SJF for Average waiting time & Average response time.

FCFS

Process	Brust time	waiting time	Turn around time
P_1	5	0	5
P_2	7	5	12
P_3	9	12	21
P_4	7	21	28

Gantt chart

P_1	P_2	P_3	P_4
0	5	12	21	28

Average waiting time = $\frac{0+5+12+21}{4}$ = 9.5 ms

Average turnaround time = $\frac{5+12+21+28}{4}$ = 16.5 ms

SJF

Process	Brust time	waiting time	turn around time
P_1	5	0	5
P_2	7	5	12
P_4	7	12	19
P_3	9	19	28

Gantt chart

P_1	P_2	P_4	P_3
0	5	12	19	28

Average waiting time = $\frac{0+5+12+19}{4}$ = 9 ms

Average Turnaround time = $\frac{5+12+19+28}{4}$

= 16 ms

Process	Time
P_1	13
P_2	10
P_3	9
P_4	10

sequence: P_3, P_4, P_1, P_2

Find out average waiting and turnaround time for SJF and FCFS.

⟹ FCFS

Process	Brust time	waiting time	Turnaround time
P_3	9	0	9
P_4	10	9	19
P_1	13	19	32
P_2	10	32	42

Gantt chart =

P_3	P_4	P_1	P_2
0	9	19	32	42

∴ Average waiting time

$= \frac{0 + 9 + 19 + 32}{4}$

$= \boxed{15 \text{ ms}}$

∴ Average turnaround time $= \frac{9 + 19 + 32 + 42}{4}$

$= \boxed{25.5 \text{ ms}}$

SJF:

Process	Brust time	waiting time	turnaround time
P_3	9	0	9
P_4	10	9	19
P_2	10	19	29
P_1	13	29	42

Gantt chart

P_3	P_4	P_2	P_1
0	9	19	29	42

⟹ Average waiting time $= \frac{0 + 9 + 19 + 29}{4}$

$= \boxed{14.5 \text{ ms}}$

⟹ Average turnaround time $= \frac{9 + 19 + 29 + 42}{4}$

$= \boxed{24.7 \text{ ms}}$

by default lower no of priority high priority

Priority scheduling Algorithm:

process	Brust time	Priority
P_1	5	4
P_2	10	2
P_3	7	1
P_4	9	3

→ Gantt chart

process	time	priority	waiting time	turn around
P_3	7	1	0	7
P_2	10	2	7	17
P_4	9	3	17	26
P_1	5	4	26	31

P_3	P_2	P_4	P_1
0	7	17	26	31

Example

process	time	Priority
P_1	5	2
P_2	10	1
P_3	25	2
P_4	12	3
P_5	17	4

Find out
FCFS
SJF
PS

→ FCFS

process	Brust time	waiting time	turnaround time
P_1	5	0	5
P_2	10	5	15
P_3	25	15	40
P_4	12	40	52
P_5	17	52	69

Gantt chart

P_1	P_2	P_3	P_4	P_5
0	5	15	40	52	69

Average waiting time = $\frac{0+5+15+40+52}{5} = \frac{112}{5} = 22.4$ ms

60
52
112

Average turn around time = $\frac{5+15+40+52+69}{5} = \frac{181}{5} = 36.4$ ms

69
181

SJF :

process	burst time	waiting time	turnaround time
P_1	5	0	5
P_2	10	5	15
P_4	12	15	27
P_5	17	27	44
P_3	25	44	69

Gantt chart

P_1	P_2	P_4	P_5	P_3
0	5	15	27	44	69

Average waiting time = $\frac{0+5+15+27+44}{5} = \frac{91}{5} = 18.2$ ms

Average turnaround time = $\frac{5+15+27+44+69}{5} = \frac{\frac{22.}{110}}{5} = 22.6$ ms

Priority scheduling

Process	burst time	Priority	waiting time	turn around
P_2	10	1	0	10
P_1	5	2	10	15
P_3	25	2	15	40
P_4	12	3	40	52
P_5	17	4	52	69

Gantt chart

P_2	P_1	P_3	P_4	P_5
0	10	15	40	52	69

Average waiting time = $\frac{0+10+15+40+52}{5} = \frac{\frac{23.}{117}}{5} = 23.4$ ms

Average turnaround time = $\frac{10+15+40+52+69}{5} = \frac{\frac{37.}{185}}{5} = 37.2$ ms