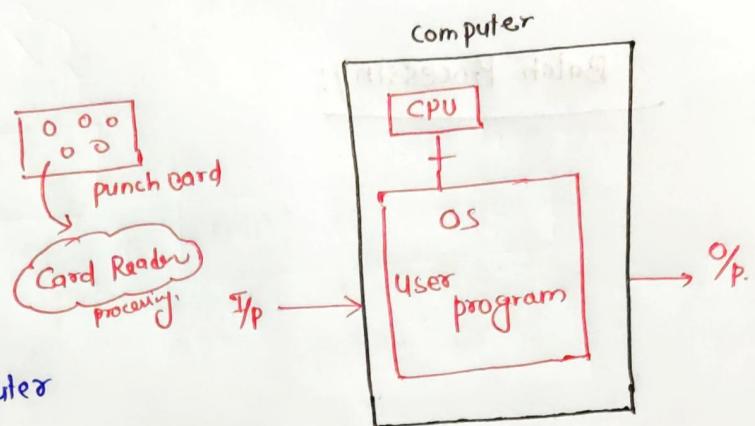


OS-
Lect-03

31/11/2029

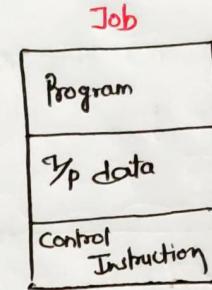
PGDCA.



In Starting Mainframe Computer

→ Common I/p & O/p devices were Card readers
& tape drives.

→ User prepare a job which consisted of the
program I/p data & control instructions
Job.



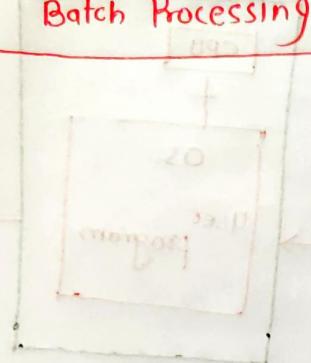
→ I/p job is given in the form of punch cards
and result also appear in form of punch card after processing.

→ So OS was very simple, always present in memory
major tasks transfer the control from one job
to another.

Poor
CPU utilization
— I/p output slow time.

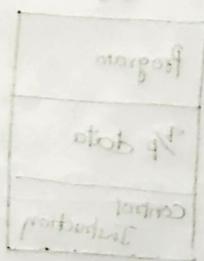
20
ca-pref
Pcap 11/15
10/12/15

Batch Processing:



storage configuration consists of

multiple physical drives connected to a common SCSI bus ←
- shared by multiple hosts

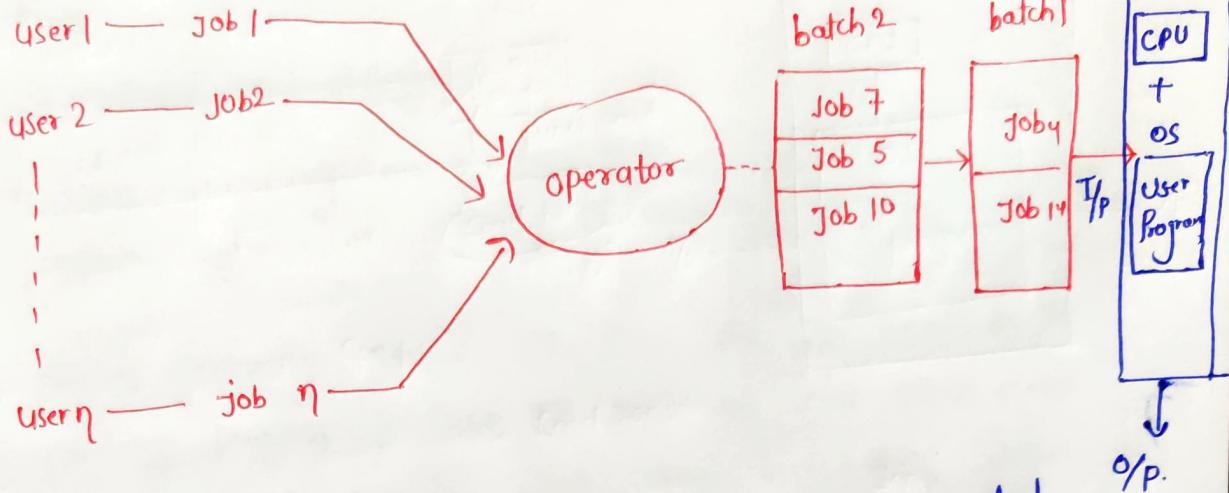


each job batches data into a queue & allocates resources to it →
- shared by multiple hosts

problem of fairness among different users is due to
the fact that each user has different requirements &
- different priorities

fairness criteria
- round robin
- weighted round robin
- priority scheduling

Batch Operating System



jobs with similar needs are batched together and executed through the processor as a group.

→ Operator sorts jobs as a deck (समूह) of punch cards into batch with similar needs.

Ex: FORTRAN batch, COBOL Batch.

*jobs with similar needs are bundled up.
So time execution improvement.*

Advantages

→ in a batch job executes one after another saving time from activities like loading compiler.

→ during a batch execution no manual intervention is needed.

memory limited.

Disadvantages :-

→ memory limitation

→ interaction of I/O & O/P devices directly with CPU.

Multi Programming Operating System

→ Maximize CPU utilization.

→ Multiprogramming means more than one process in main memory which are ready to execute.

Multi
Programming
multiprocessing

→ Process generally require CPU time and I/O time. So if running process perform I/O or some other event which do not require CPU then instead of sitting idle, CPU make a context switch and picks some other process and this idea will continue.

→ CPU never idle unless there is no process ready to execute or at time of context switch

Advantage

- o High CPU Utilization
- o less waiting time, response time etc.
- o may be extended to multiple users.

Now-a days useful when load is more.

Disadvantages

- o Difficult Scheduling
- o main memory management is required.
- o memory fragmentation.

Paging (Non-contiguous memory allocation).

CPU Scheduling

→ A process execution consists of a cycle of CPU execution and I/O execution.



Normally every process begins with CPU burst that may be followed by I/O burst, then another CPU burst (User CPU works then I/O works at fast - CPU work) and then I/O burst and so on eventually in the last will end up on CPU burst.

CPU Bound Process: These are those processes which require most of the time on CPU.

I/O Bound Process: These are those processes which require most of the time on I/O devices

A good CPU Scheduling idea should choose the mixture of both so that both I/O devices and CPU can be utilized efficiently.

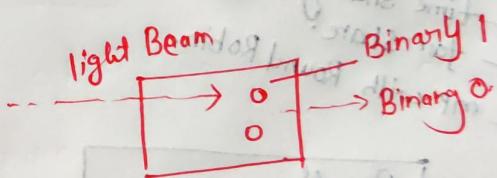
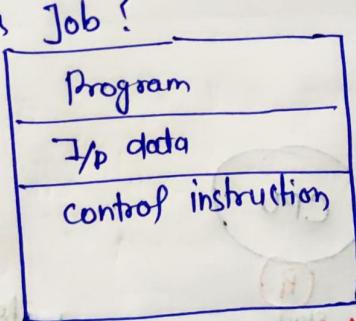
Types of OS

- ① Batch OS
- ② Multiprogramming OS
- ③ Multi tasking OS
- ④ Multiprocessing
- ⑤ Real Time OS
- ⑥ N/w OS
- ⑦ mobile OS
- ⑧ multiUser OS.

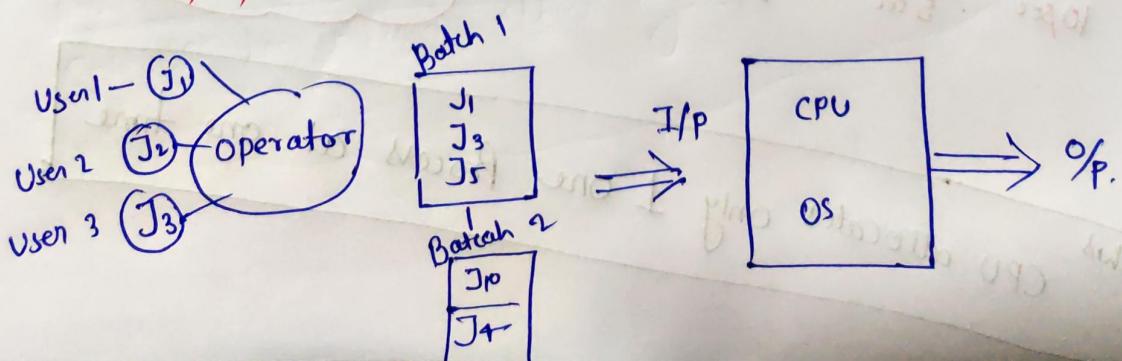
① Batch OS

One Batch having multiple job

what is Job?
Combo. of

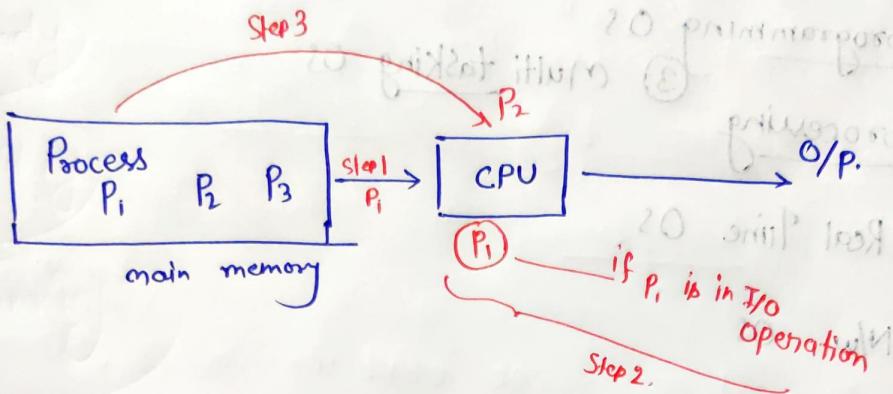


→ Batch OS were non-interactive
→ user performs job on Punch Card.



Only 1 CPU

Multi Programming



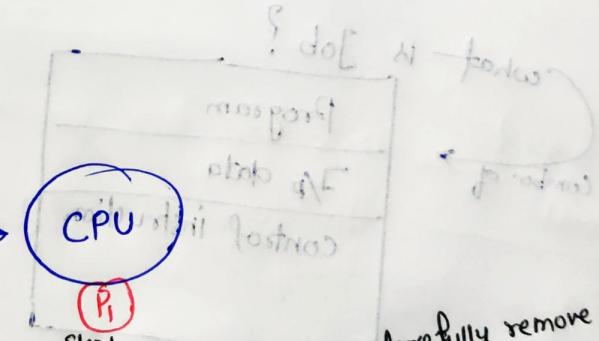
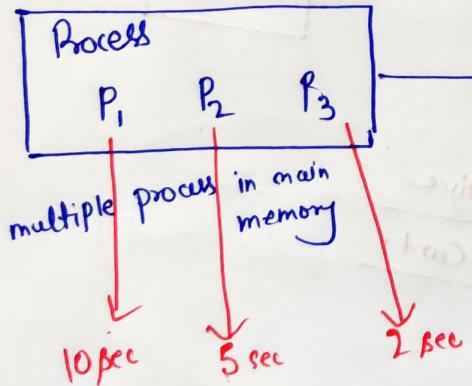
Drawback — we can not forcefully remove P_1 process to execute P_2

Only 1 CPU

Multi Tasking

- time sharing.
- fair share.
- MP with Round Robin.

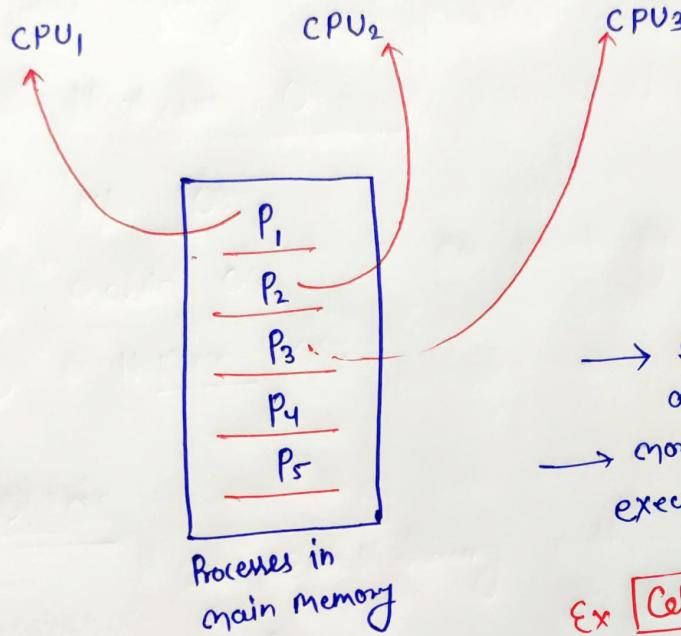
glue extension to Multitasking



In this, CPU allocates only 1 one process at one time

multi CPU are there

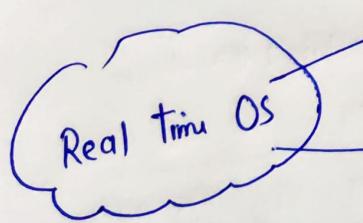
multi Processing OS



- In M.Processing multiple CPU are there
- more than one process can execute parallelly.

Ex **Celeron**
 Dual core
 Quad core
 Octo core

multi computing OS : multiple computers are there.



✓ Time Bomb
 missile launching

Soft RT — The processes should be completed within the time bound.

Hard RT — The process should be completed at exact time.

Process State Transition Diagram

5

New

Ready

Waiting

Running

terminated

CPU

CPU

CPU

19
19
19
19
19

(ii) Deadlock
Bacon's Lamps

[bacon] 23

Two lams
One lamp
One lamp
One lamp

• deadlock → no progress (deadlock)
• starvation → no progress (starvation)

Initial state of lams: T1 off, T2 off

T1 on, T2 off

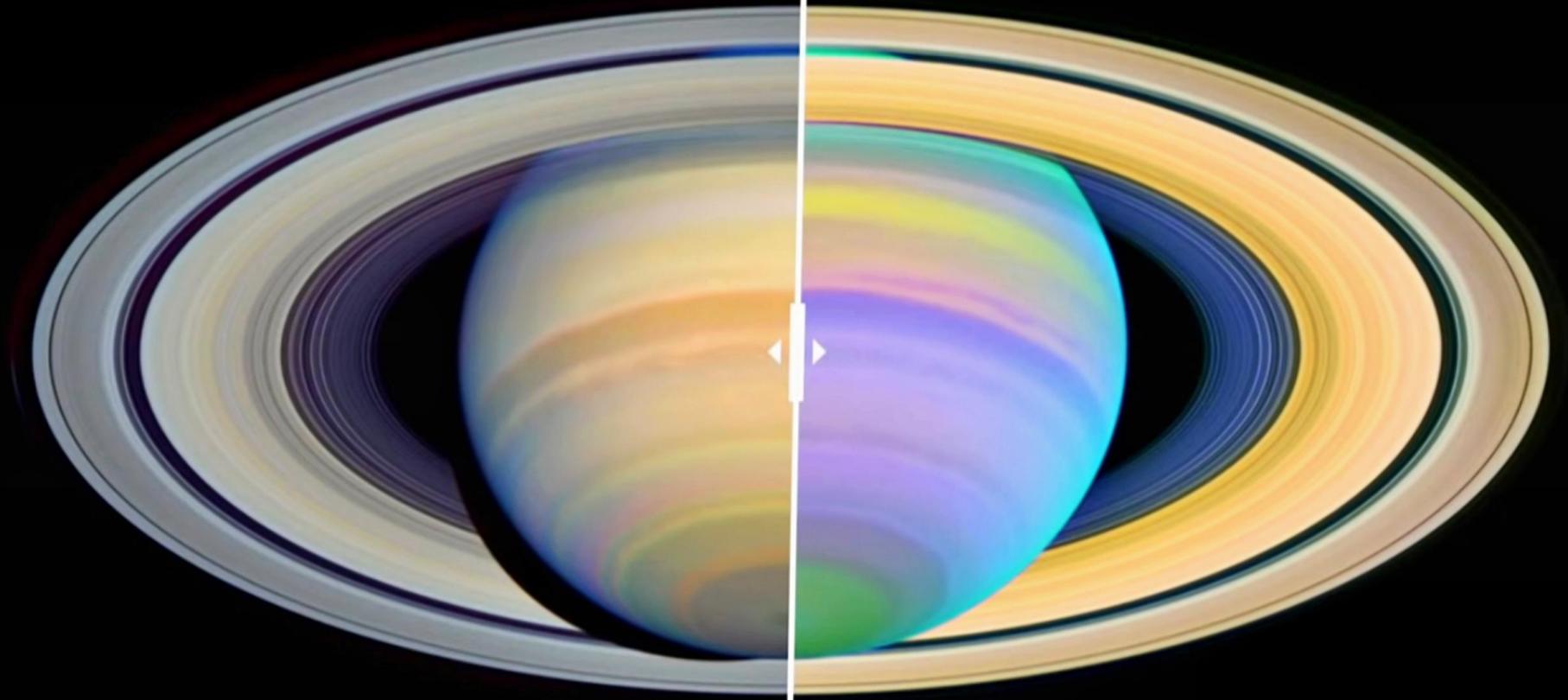
Initial state of lams: T1 off, T2 off
• wait times 10

20 wait 1000

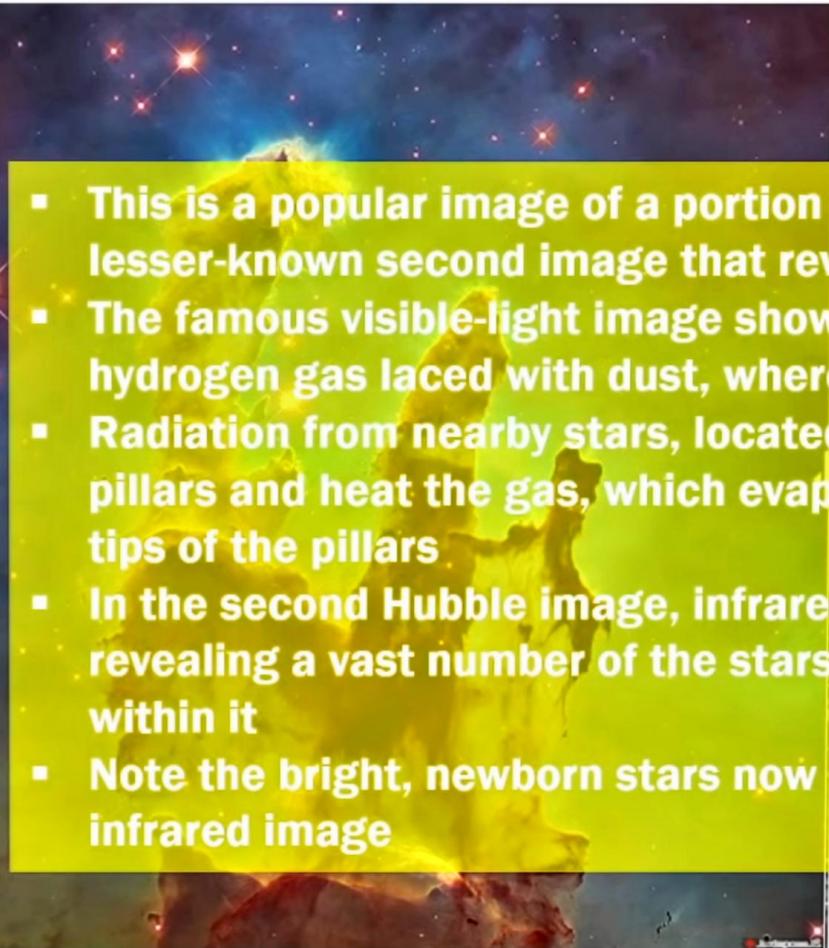
deadlock
lamps off
lamps off

Visible

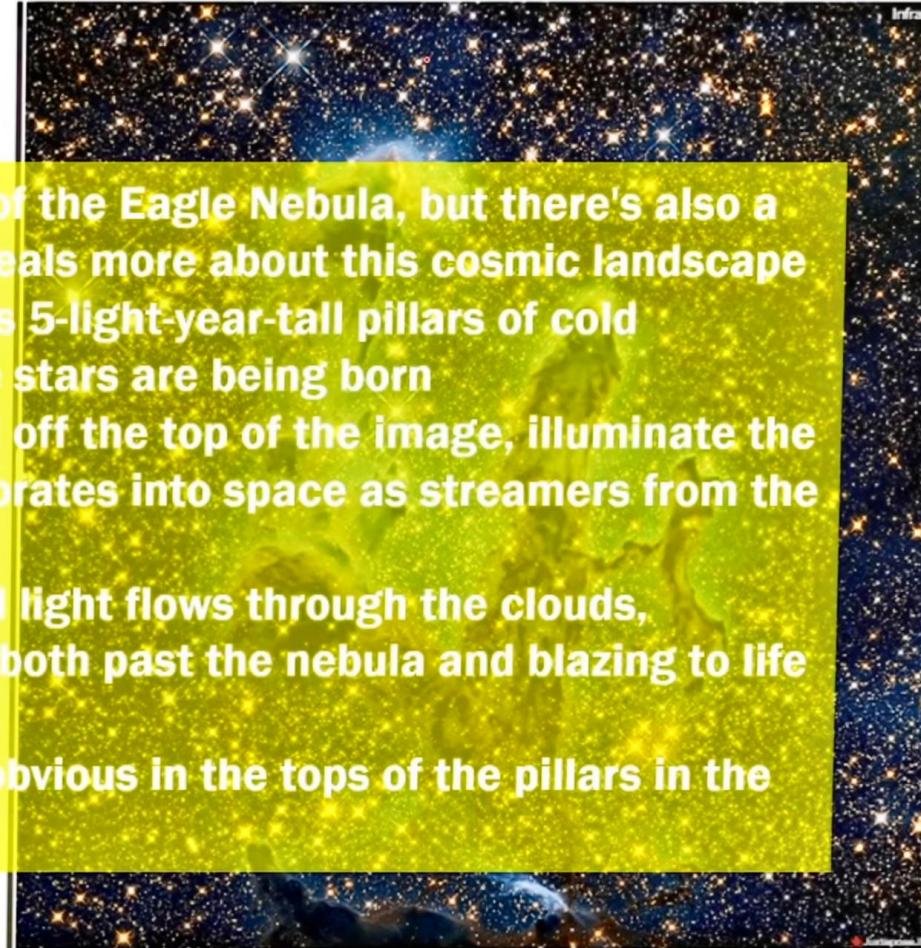
Ultraviolet



- This is a popular image of a portion of the Eagle Nebula, but there's also a lesser-known second image that reveals more about this cosmic landscape
- The famous visible-light image shows 5-light-year-tall pillars of cold hydrogen gas laced with dust, where stars are being born
- Radiation from nearby stars, located off the top of the image, illuminate the pillars and heat the gas, which evaporates into space as streamers from the tips of the pillars
- In the second Hubble image, infrared light flows through the clouds, revealing a vast number of the stars both past the nebula and blazing to life within it
- Note the bright, newborn stars now obvious in the tops of the pillars in the infrared image

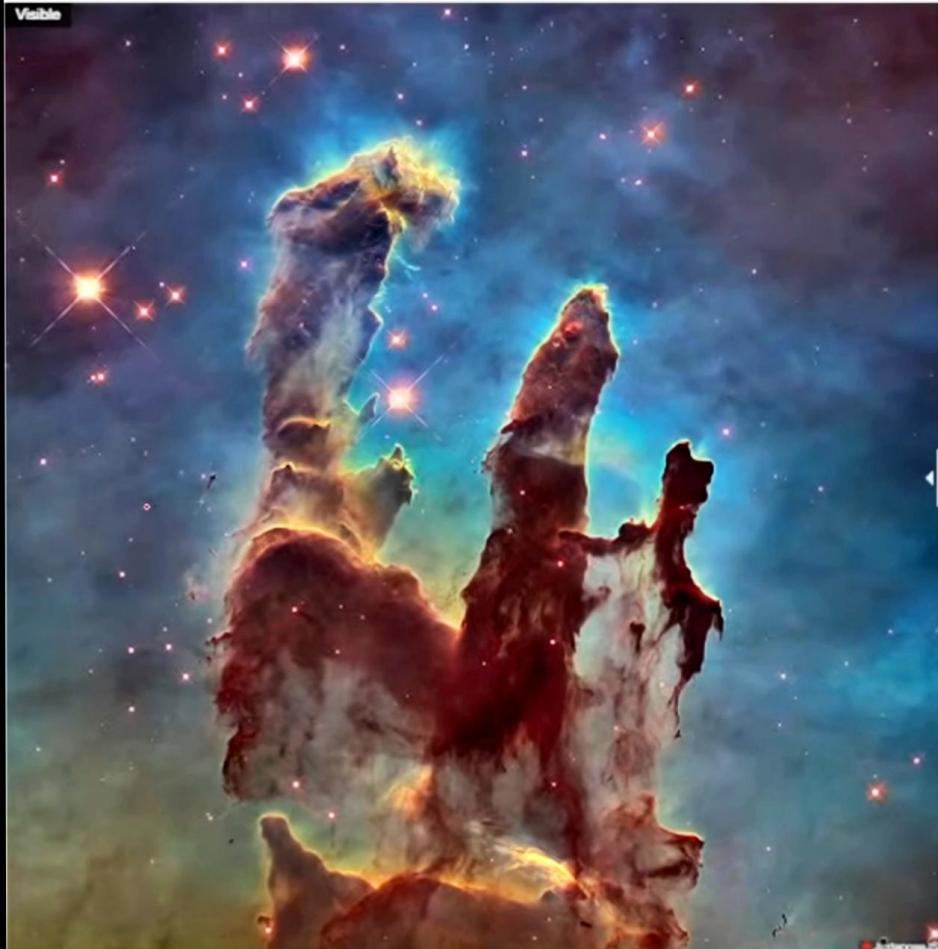


Eagle Nebula - visible light image



Eagle Nebula - infrared light image

Visible



Eagle Nebula - visible light image

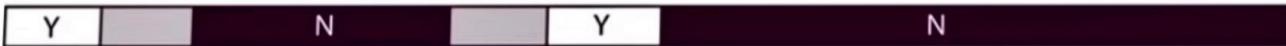
Infrared



Eagle Nebula - infrared light image

The Electromagnetic Spectrum

Penetrates Earth Atmosphere?



Wavelength (meters)

Radio	Microwave	Infrared	Visible	Ultraviolet	X-ray	Gamma Ray
10^3	10^{-2}	10^{-5}	$.5 \times 10^{-6}$	10^{-8}	10^{-10}	10^{-12}



About the size of...



Buildings



Humans



Honey Bee



Pinpoint



Protozoans



Molecules

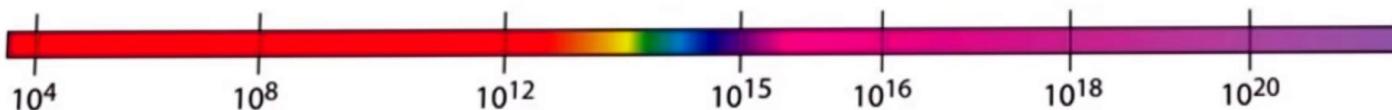


Atoms

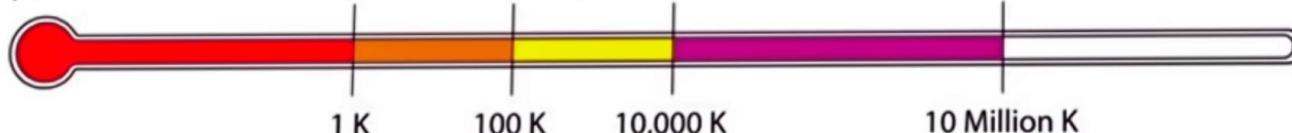


Atomic Nuclei

Frequency (Hz)



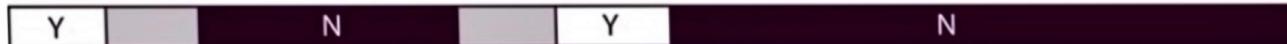
Temperature of bodies emitting the wavelength (K)



The Electromagnetic Spectrum

Academy

Penetrates Earth Atmosphere?



Wavelength (meters)

Radio	Microwave	Infrared	Visible	Ultraviolet	X-ray	Gamma Ray
10^3	10^{-2}	10^{-5}	$.5 \times 10^{-6}$	10^{-8}	10^{-10}	10^{-12}



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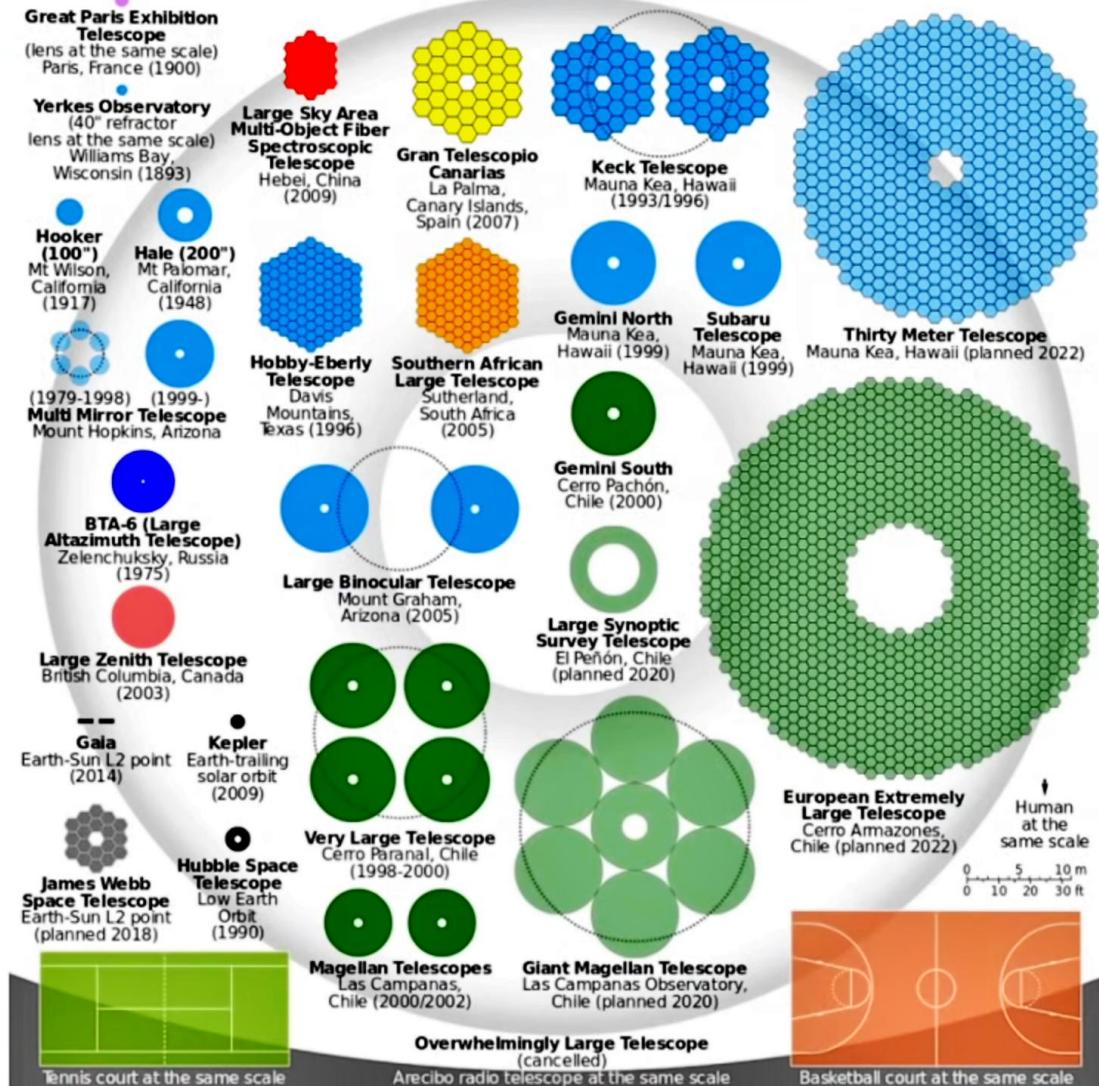
Atoms



Atomic Nuclei

I I S into huauotimy

EM spectrum is the entire range of light that exists. Any atom above absolute zero temperature will vibrate, and emit some form of EM. From radio waves to gamma rays, most of the light in the universe is, in fact, invisible to humans! Light is a wave of alternating electric and magnetic fields.

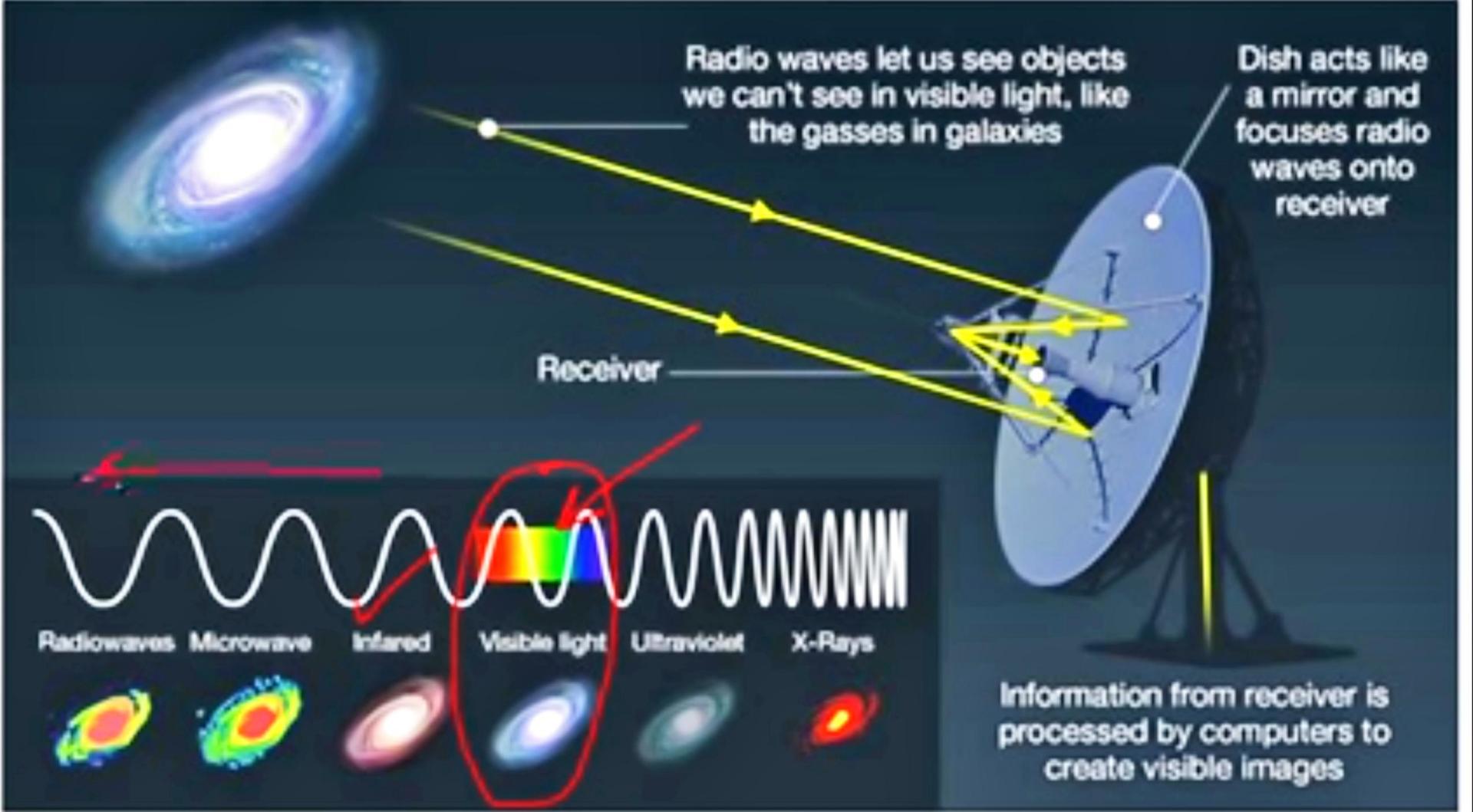


- A whole family of very large telescopes is arriving

ARECIBO OBSERVATORY, Puerto Rico



World's largest single-unit radio telescope (until FAST in China, 2016). Built in the early 1960s, it employed a 305-metre (1,000-foot) spherical reflector of perforated aluminum panels that focused incoming radio waves on movable antenna structures positioned about 168 metres above the reflector surface.



Radio waves let us see objects we can't see in visible light, like the gasses in galaxies

Dish acts like a mirror and focuses radio waves onto receiver

Receiver



Information from receiver is processed by computers to create visible images