

SER 321 B Session

SI Session

Sunday, April 14th 2024

7:00 pm - 8:00 pm MST

Agenda



Parallel vs. Distributed Systems

When to Distribute

Distributed Structures

Consensus

SI Session Expectations

Thanks for coming to the **SER 321** SI session. We have a packed agenda and we are going to try to get through as many of our planned example problems as possible. This session will be recorded and shared with others.

- If after this you want to see additional examples, please visit the drop-in tutoring center.
- We will post the link in the chat now and at the end of the session.
 - tutoring.asu.edu
- Please keep in mind we are recording this session and it will be made available for you to review 24-48 hours after this session concludes.
- Finally, please be respectful to each other during the session.

Interact with us:

Zoom Features



Zoom Chat

- Use the chat feature to interact with the presenter and respond to presenter's questions.
- Annotations are encouraged

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Systems

Parallel



A Venn diagram with two overlapping circles. The left circle is light blue with a blue outline and is labeled 'Parallel'. The right circle is light red with a red outline and is labeled 'Distributed'. The intersection of the two circles is shaded with a mix of blue and red. The text 'SER 321' is in a yellow box at the top left, and 'Systems' is in a black box below it.

Distributed

Parallel

- Single computer
- Work split among different *processors*
- Memory is shared **or** distributed
- Communicate through *bus*

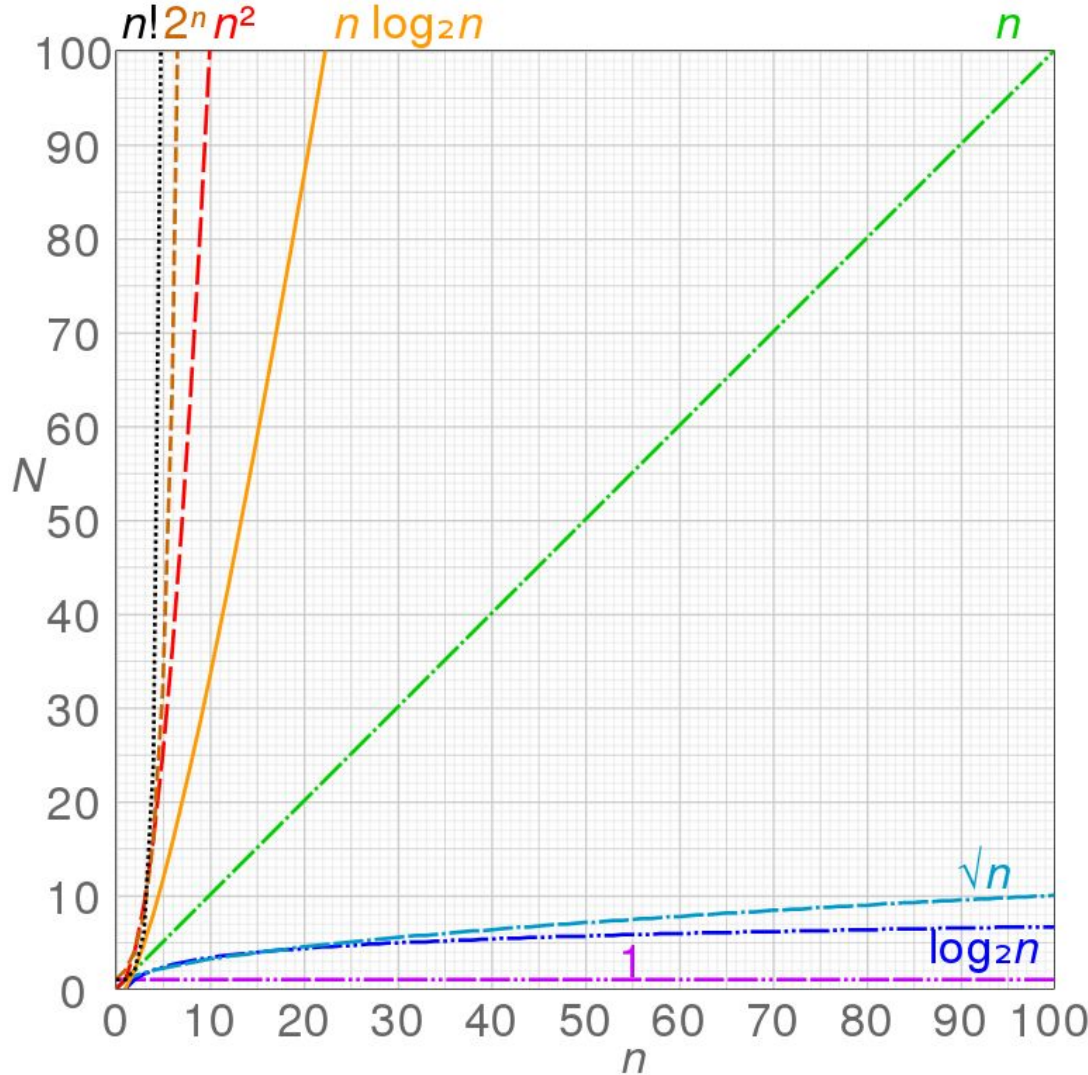
Distributed

- Work is partitioned
- Partitions processed individually
- **Can** improve performance
- **Can** improve speed
- Many computers
- Work split among different *locations*
- Memory is distributed
- Communicate through *message passing*

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Distributed Systems

When should
we *consider*
distributing?

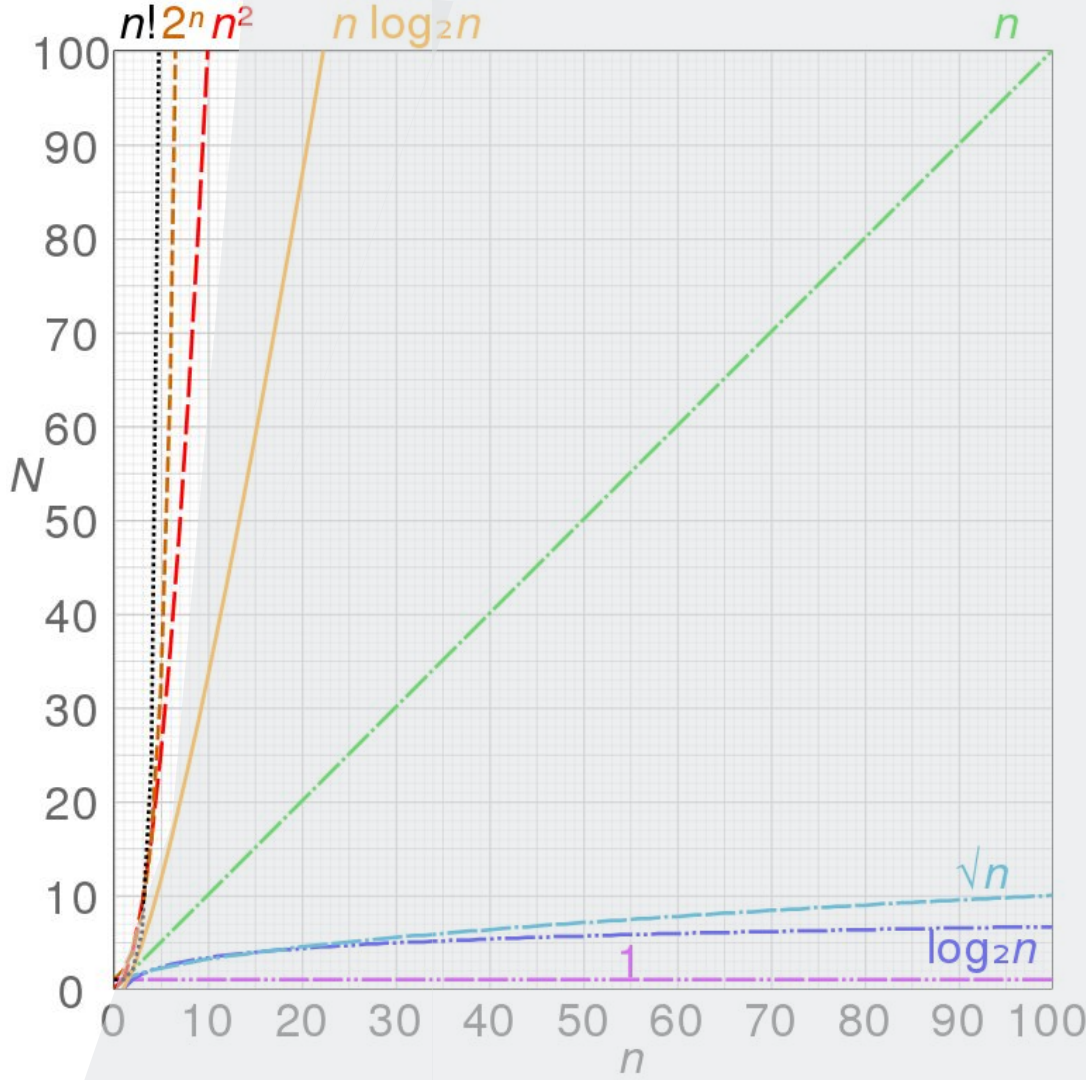


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Distributed Systems

When should
we *consider*
distributing?

Super Duper Extra Extra
Large Orders of Magnitude!

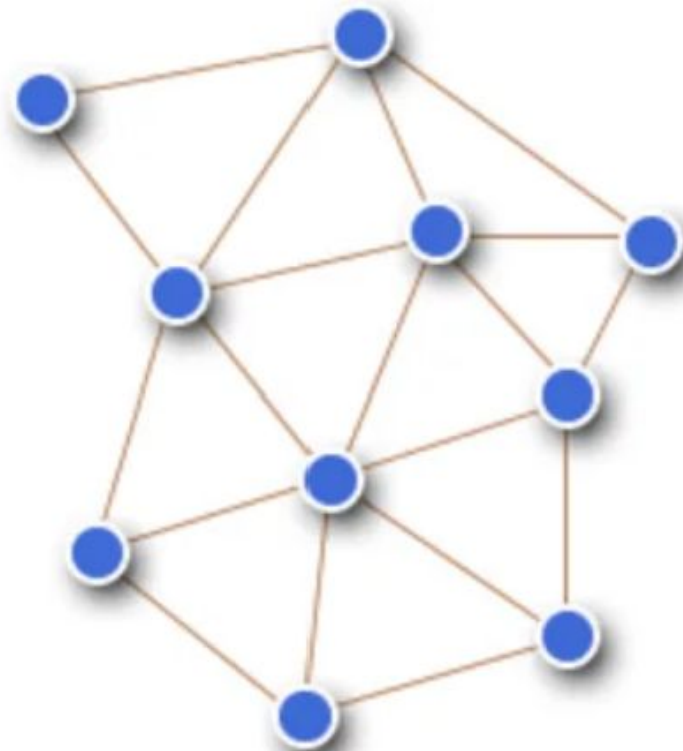


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Distributed Systems

Remember that we are operating in *reality*

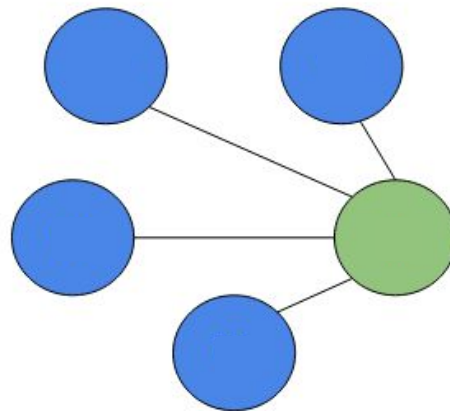
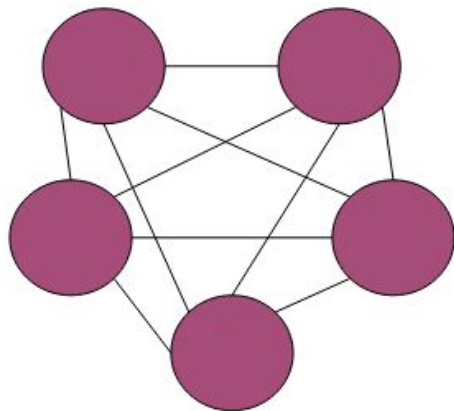
- Nodes *will* fail
- Web of nodes *will constantly* change
- Network is not *always* reliable
- Latency is *always present*
- The path traversed *changes*
- Some resources *must be shared*
- *You* need to prevent the pitfalls!
 - No deadlocks
 - No starvation
 - No error states



Main and Worker

Peer to Peer

Which is which?



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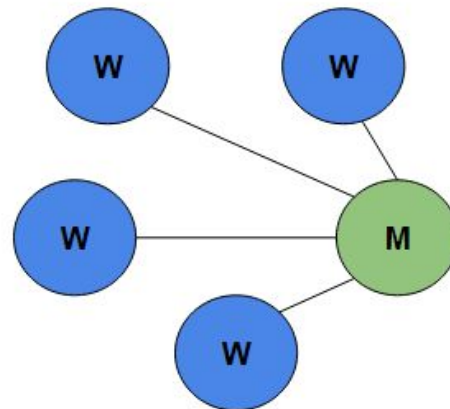
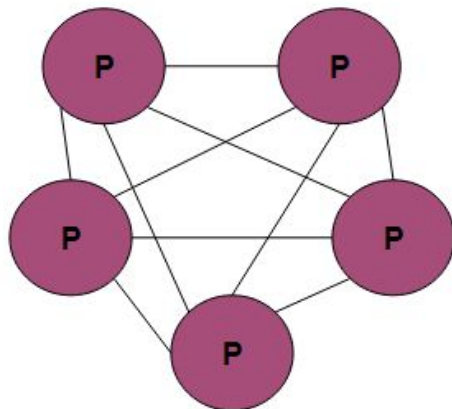
Distributed Systems

Main and Worker

Peer to Peer

Which is which?

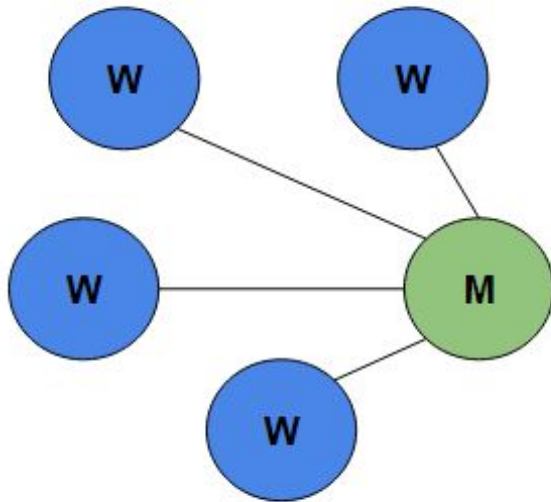
Peer to Peer



Main and
Worker

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Distributed Systems



Pros and Cons

Pros:

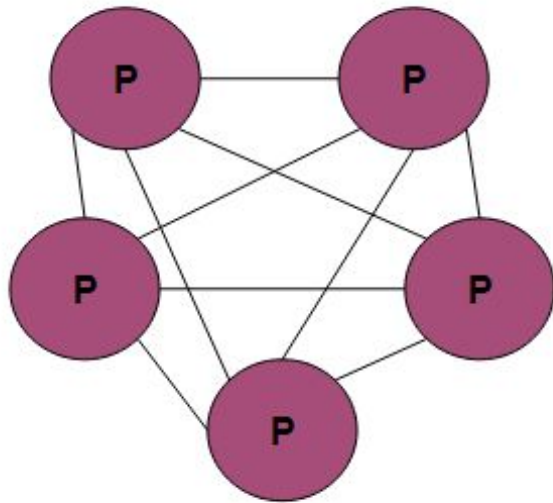
- Straightforward setup
- Logic is centralized
- Communication is linear

Cons:

- Single point of failure

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Distributed Systems



Pros and Cons

Pros:

- Peers can join or leave as needed
- Robust - no single point of failure

Cons:

- Communication is *complex*
- Setup is not as straightforward
- Client connections are handled *differently*

We will cover this in a moment!

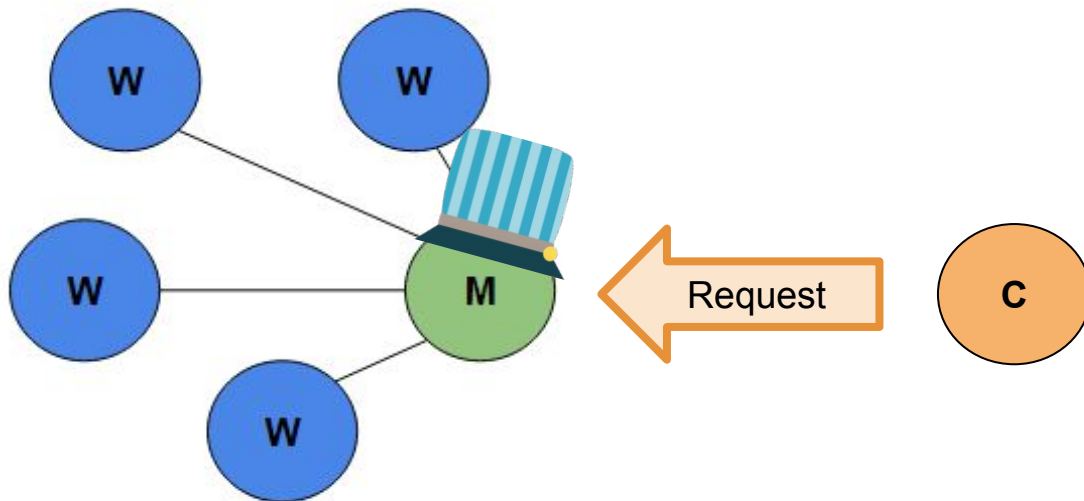
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Distributed Systems

Process Flow!

DATA

Workers
only do
their task
then report
back



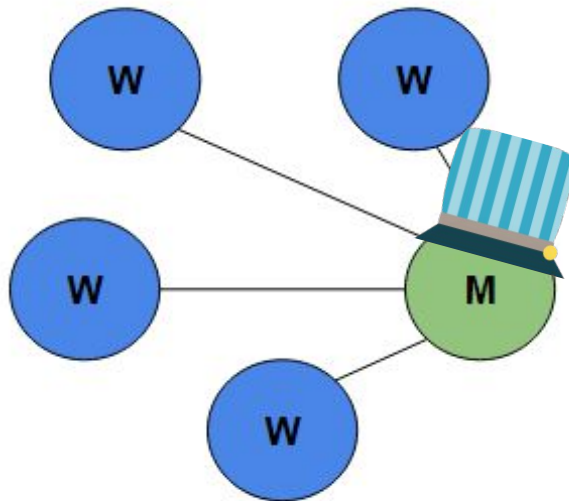
Main is like our server

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Distributed Systems

Process Flow!

Workers
only do
their task
then report
back



DATA



D1

D2

D3

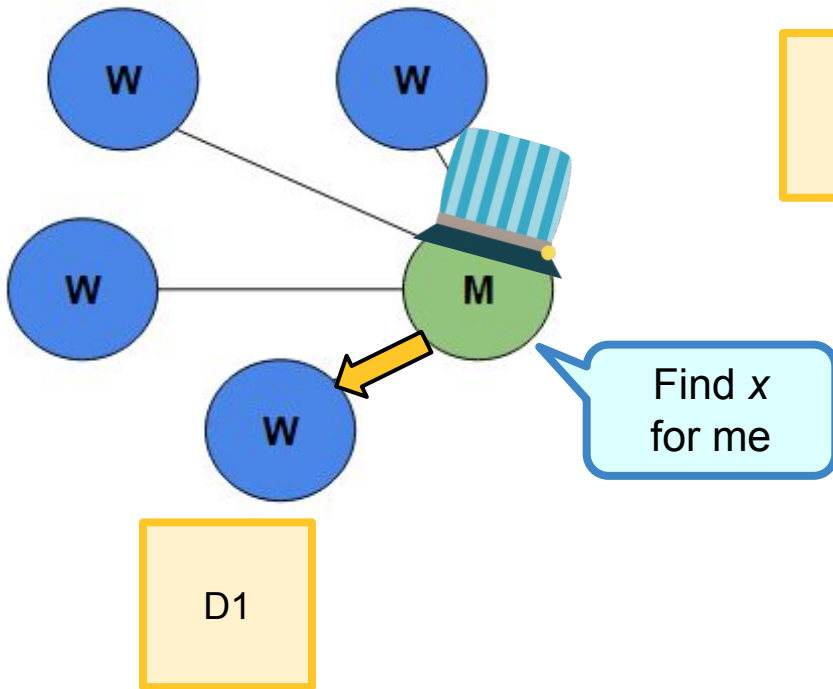
D4

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Distributed Systems

Process Flow!

Workers
only do
their task
then report
back



DATA



D1

D2

D3

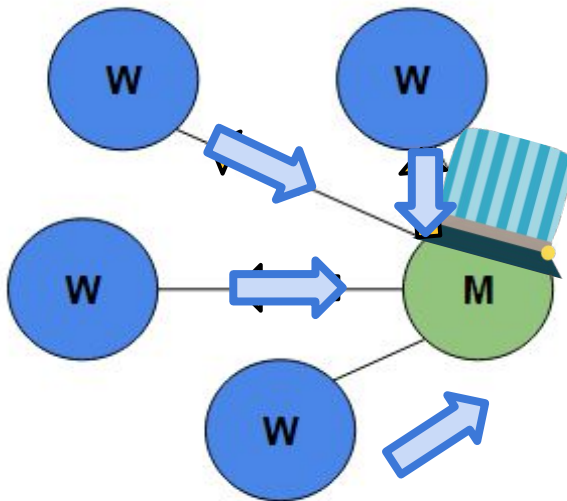
D4

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Distributed Systems

Process Flow!

Workers
only do
their task
then report
back



D1

DATA



D1

D2

D3

D4

D1
Result

D2
Result

D3
Result

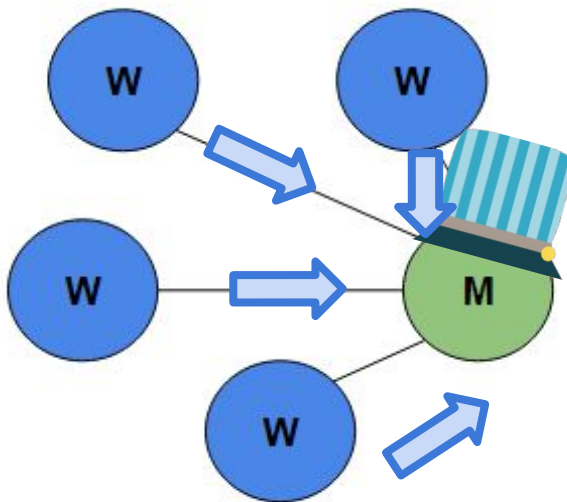
D4
Result

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Distributed Systems

Process Flow!

Workers
only do
their task
then report
back



D1

DATA



D1

D2

D3

D4

D1
Result

D2
Result

D3
Result

D4
Result



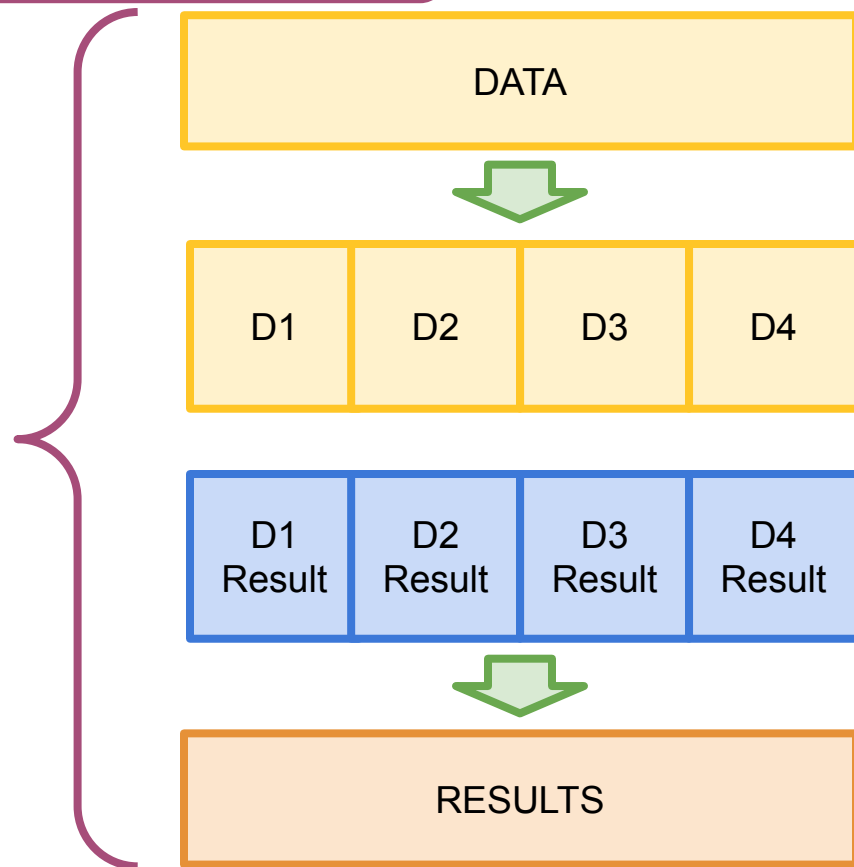
RESULTS

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Distributed Systems

What about Peer to Peer?

Would this sequence
(*the data handling*) change
in the different structure?



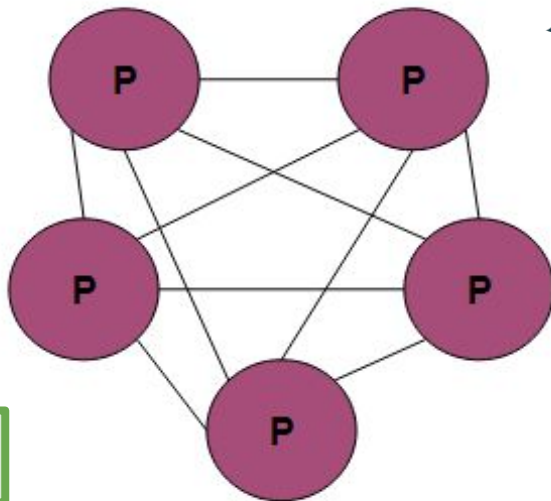
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Distributed Systems

What about Peer to Peer?

We need someone to wear the conductor hat!

Need a **LEADER**



How do we choose a leader?

DATA



D1

D2

D3

D4

D1
Result

D2
Result

D3
Result

D4
Result



RESULTS

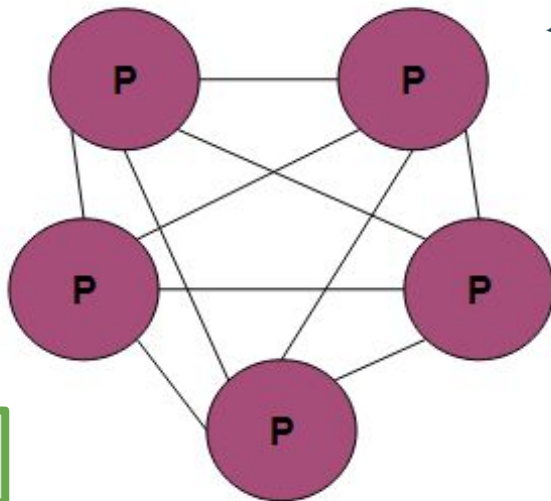
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Distributed Systems

What about Peer to Peer?

We need
someone to
wear the
conductor
hat!

Need a **LEADER**



Leader Election!

DATA



D1

D2

D3

D4

D1
Result

D2
Result

D3
Result

D4
Result



RESULTS

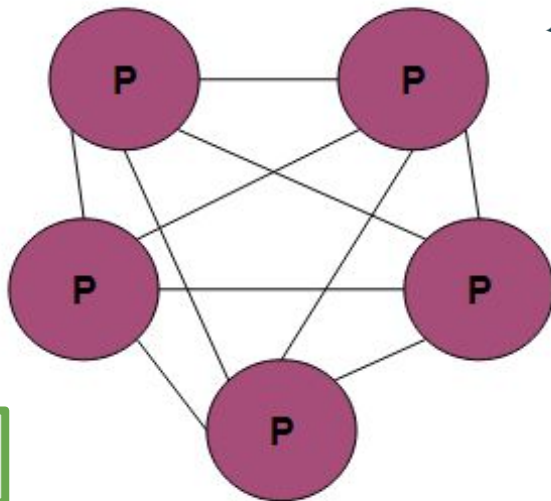
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Distributed Systems

What about Peer to Peer?

We need
someone to
wear the
conductor
hat!

Need a **LEADER**



Leader Election!

Type of
CONSENSUS

What's
consensus?



“General agreement or
trust amongst a group”

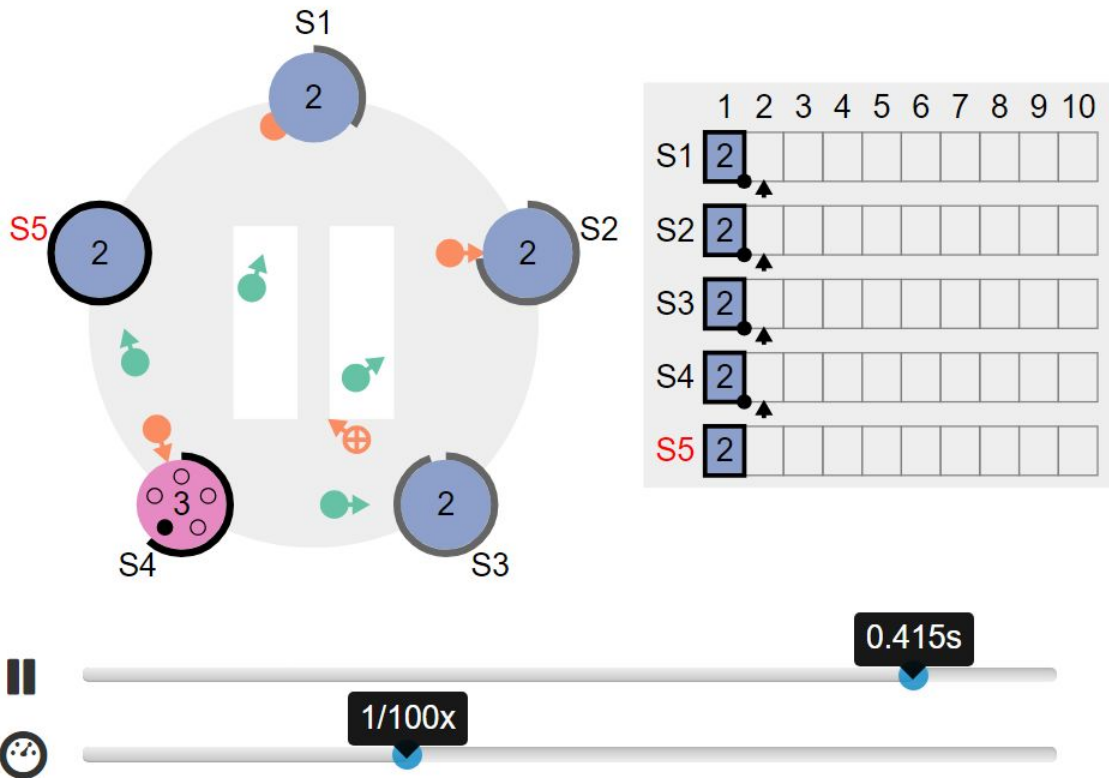
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RAFT

RAFT is a
great
consensus
example!

Leader Election

Log Replication



[The Secret Lives of Data](#) is a different visualization of Raft. It's more guided and less interactive, so it may be a gentler starting point.

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Scratch Space

Questions?

Survey:

<http://bit.ly/ASN2324>



Upcoming Events

SI Sessions:

- Monday, April 15th at 7:00 pm MST
- Thursday, April 18th at 7:00 pm MST
- Sunday, April 21st at 7:00 pm MST - **REVIEW SESSION**
- Monday, April 22nd at 7:00 pm MST - **Q&A SESSION**
- ~~Thursday, April 25th at 7:00 pm MST~~ - **CANCELLED**

Review Sessions:

- Sunday, April 21st at 7:00 pm MST
- **Thursday, April 25th Session is *cancelled***

More Questions?

Check out our other resources!

tutoring.asu.edu



Academic Support

Academic Support Network (ASN) provides a variety of free services in-person and online to help currently enrolled ASU students succeed academically.

Services



Subject Area Tutoring

Need in-person or online help with math, science, business, or engineering courses? Just hop into our Zoom room or drop into a center for small group tutoring. We'll take it from there.

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Go to Zoom



Writing Tutoring

Need help with undergraduate or graduate writing assignments? Schedule an in-person or online appointment, access your appointment link, or wait in our drop-in queue.

[Access your appointment link](#)

[Access the drop-in queue](#)

Schedule Appointment



Online Study Hub

Join our online peer communities to connect with your fellow Sun Devils. Engage with our tools to search our bank of resources, videos, and previously asked questions. Or, ask our Tutorbot questions.

Now supporting courses in Math, Science, Business, Engineering, and Writing.

Online Study Hub

1-

Go to Zoom

2-

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[View digital resources](#)



1. Click on 'Go to Zoom' to log onto our Online Tutoring Center.
2. Click on 'View the tutoring schedule' to see when tutors are available for specific courses.

More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub

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Online Study Hub

Online peer communities for students and tutors, YouTube channels, and Tutorbots.



What are online peer communities?

Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.



How can tutoring center videos help?

Videos can help supplement the learning you're doing in and outside of class and include step-by-step methods for how to understand concepts.



How does the Tutorbot work?

You can ask the Tutorbot questions about course concepts and the Tutorbot will recommend additional resources and examples to help address your questions.

Select a subject

- Any -

Apply



Academic Support Network



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Apply

Business

ACC 231

Uses of Accounting Info I

Peer Community

ACC 241

Uses of Accounting Info II

Peer Community

CIS 105

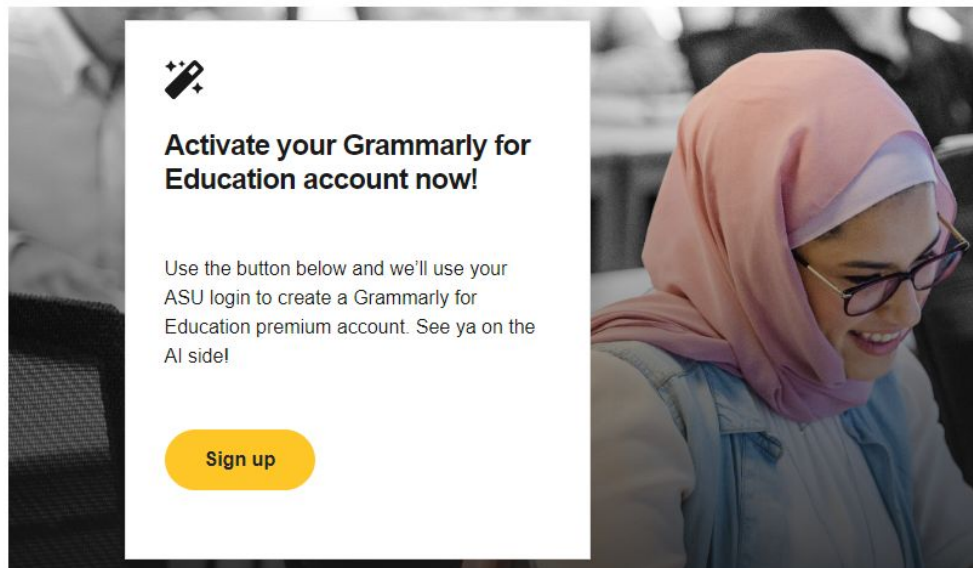
Computer Applications and Information Technology

Peer Community

Don't forget to check out the Online Study Hub for additional resources!

Expanded Writing Support Available

Including Grammarly for Education, at no cost!



tutoring.asu.edu/expanded-writing-support

*Available slots for this pilot are limited

Additional Resources

- [Course Repo](#)
- [Gradle Documentation](#)
- [GitHub SSH Help](#)
- [Linux Man Pages](#)
- [OSI Interactive](#)
- [MDN HTTP Docs](#)
 - [Requests](#)
 - [Responses](#)
- [JSON Guide](#)
- [org.json Docs](#)
- [javax.swing package API](#)
- [Swing Tutorials](#)
- [Dining Philosophers Interactive](#)
- [Austin G Walters Traffic Comparison](#)
- [RAFT](#)