

# CP317 Software Engineering

week 7-1 - Deployment

Shaun Gao, Ph.D., P.Eng.

# Agenda

- Review week 6-2 topics
- Deployment
  - Concepts
- Types of software deployments
- Deployment tasks
- Deployment plan
- **Deployment strategies**
  - Cutover
  - Stage deployment
  - Gradual cutover
  - Incremental
  - Parallel
- Deployment mistakes
- Summary

# Review week 6-2

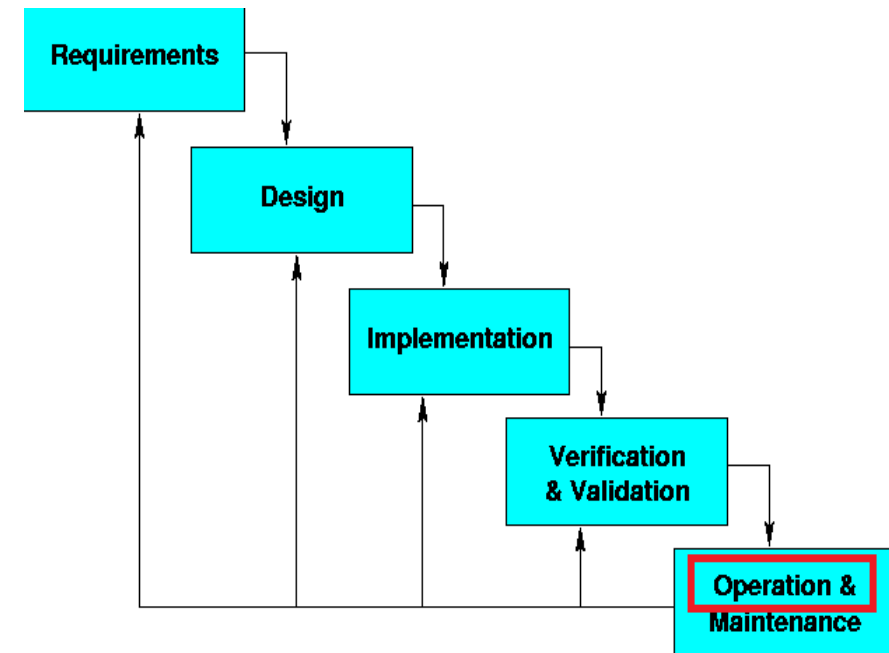
- Software testing
  - Concept
- Software testing plan
  - Test case procedure, test coverage
- Levels of software testing
  - Unit testing,
  - Integration testing: top down vs. bottom up
  - System testing
  - Acceptance testing
- Testing techniques
  - Black-box testing
  - White-box testing
- Test Driven Development (TDD)

# Introduction of software deployment

- Occupation point view
  - None -> Deployment engineer/analyst, Release engineers
  - Example: Release Engineer Skills and Qualifications
- Manual deployment <-> Automatic deployment
  - Manual deployment
    - Software products that are used in Cars, Airplanes
  - Automatic deployment
    - Devices connected to Internet
  - Internet of Things
    - The demand of software developers increases

# Deployment

- Software deployment is **all of the activities that make a new or new version of software system available for use.**
  - New software for new system
  - New version of software for existing system
- Where does software deployment fit in SE models
- It involves the following:
  - Deployment plan
  - New or new version software system
  - User training
  - Support, on-site support
  - Bug fix

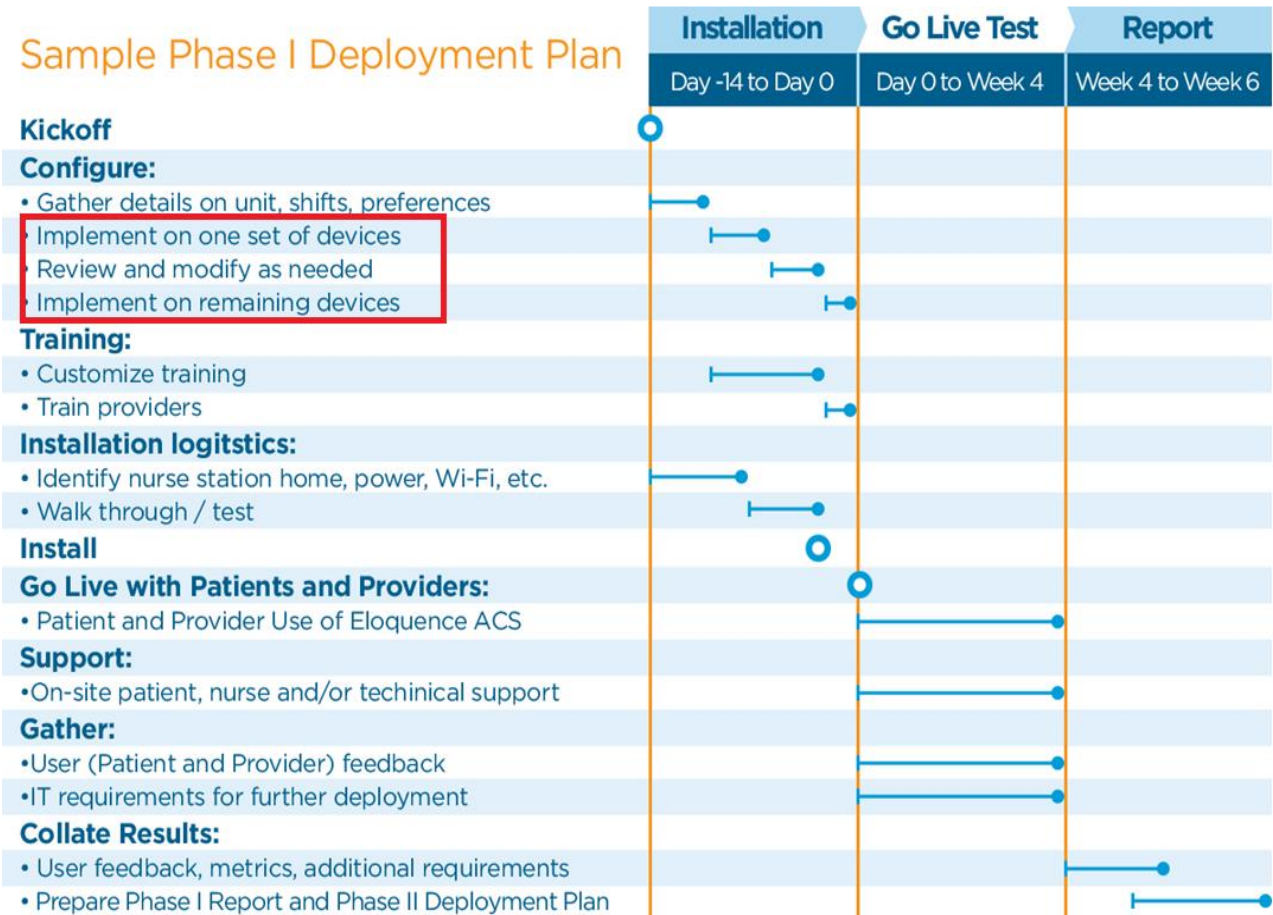


# Deployment tasks

- Plan your deployment
- Test the software product
  - Simulating real environment
- Deployment strategies
  - Cutover
  - Stage deployment
  - Gradual cutover
  - Incremental
  - Parallel
- Documentation
  - Training materials; user's manuals; help guides; contact information
- Training

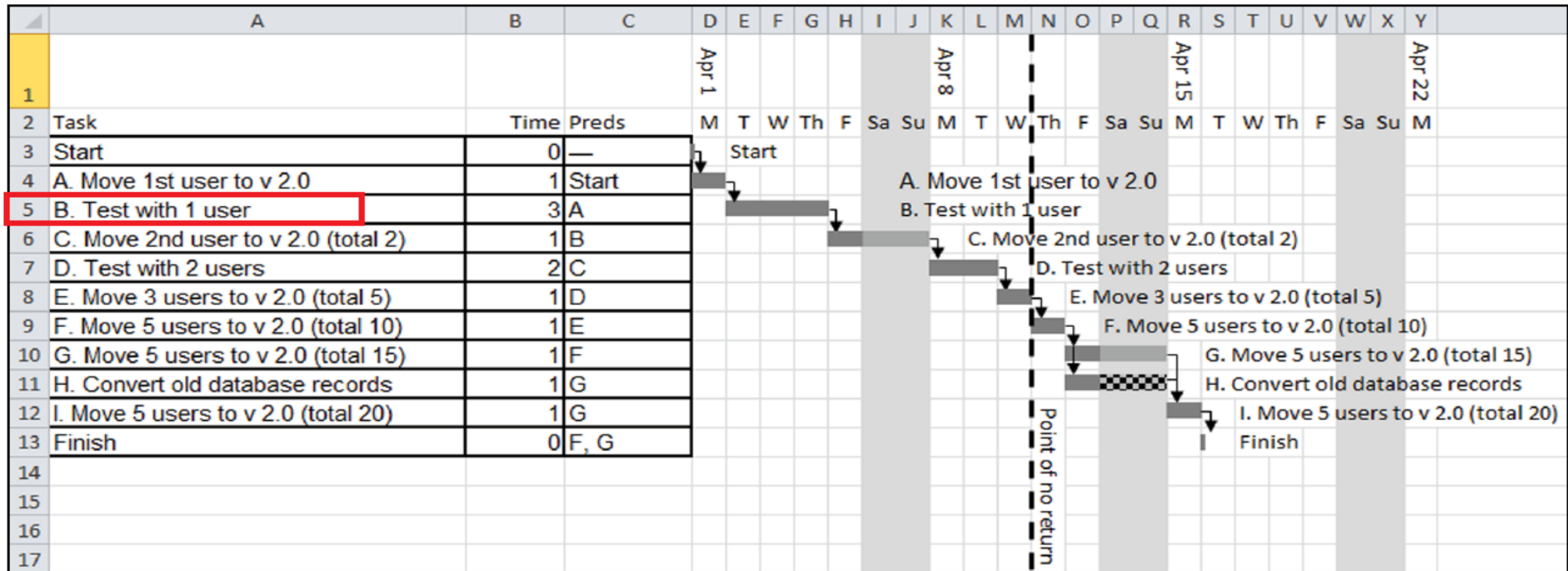
# Software deployment plan

- A software deployment plan **defines the scope, approach, and execution for the deployment of a software product.**
- Including:
  - Deployment method
    - Cutover, gradual cutover, parallel, increment, staged
  - Deployment procedure
  - Training
  - Timelines
  - Incident response
    - Rollback



# Software deployment plan – cont.

- Use Gantt chart for deployment plan – example



**FIGURE 9-1:** This schedule takes 11 work days to migrate all 20 users to AdventureTrek 2.0.

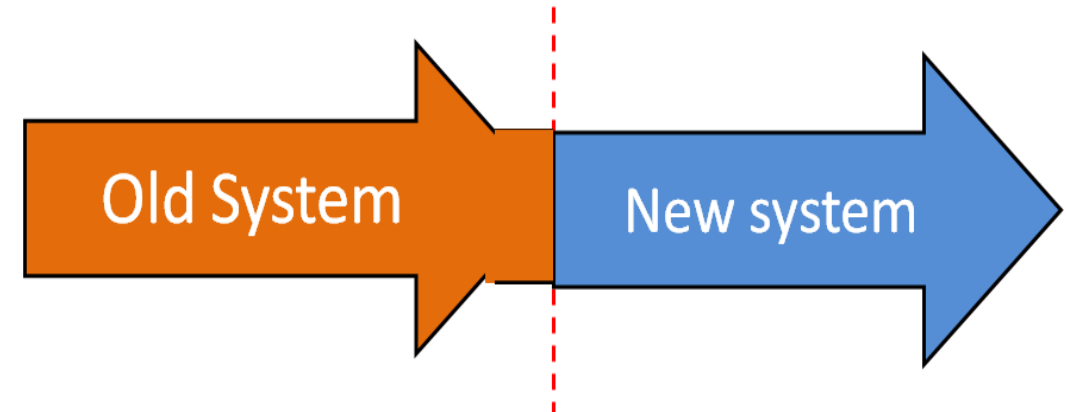


# Deployment strategies/methods

- A software deployment strategy is **a way to change or upgrade software**. The **aim** of software deployment strategy is to **make the change without downtime** in a way that the user barely notices the improvements.
- Cutover
- Staged deployment
- Gradual cutover
- Incremental deployment
- Parallel

# Deployment strategy – cont.

- Cutover
  - Cutover is **the process of deploying new or new version software to all devices at the same time.**
- Pros:
  - Easy to setup.
  - Software state entirely renewed.
- Cons:
  - High risks
  - High impact on customers
  - Expect downtime: system reboot



Example: software used in Cars,...

# Deployment strategy – cont.

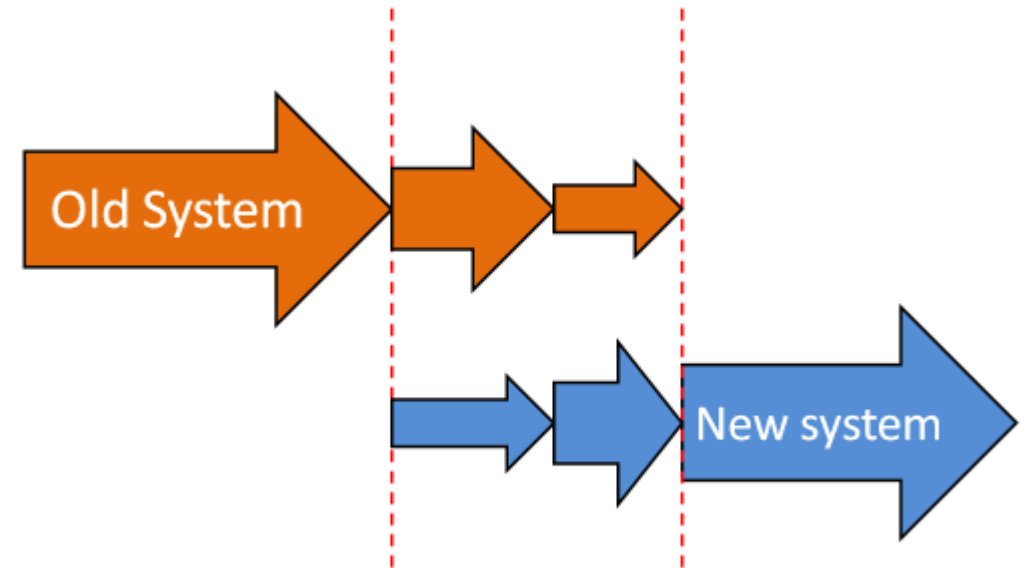
- Staged deployment
  - Staged deployment is a strategy for deployment that has exactly functional production environments for practicing deployment.
- Pros:
  - Low risks.
  - Software state entirely renewed.
- Cons:
  - Expensive
  - Expect downtime: system reboot



Examples: software for airplane Simulators or real machines

# Deployment strategy – cont.

- Gradual cutover
  - Gradual cutover is **the process of installing new software into some users' machines while other machines continue working with existing software.**
- Pros:
  - Low risks
- Cons:
  - Difficult to configure
- Examples: online deployments



# Deployment strategy – cont.

- Example of gradual cutover deployment (Gantt chart)

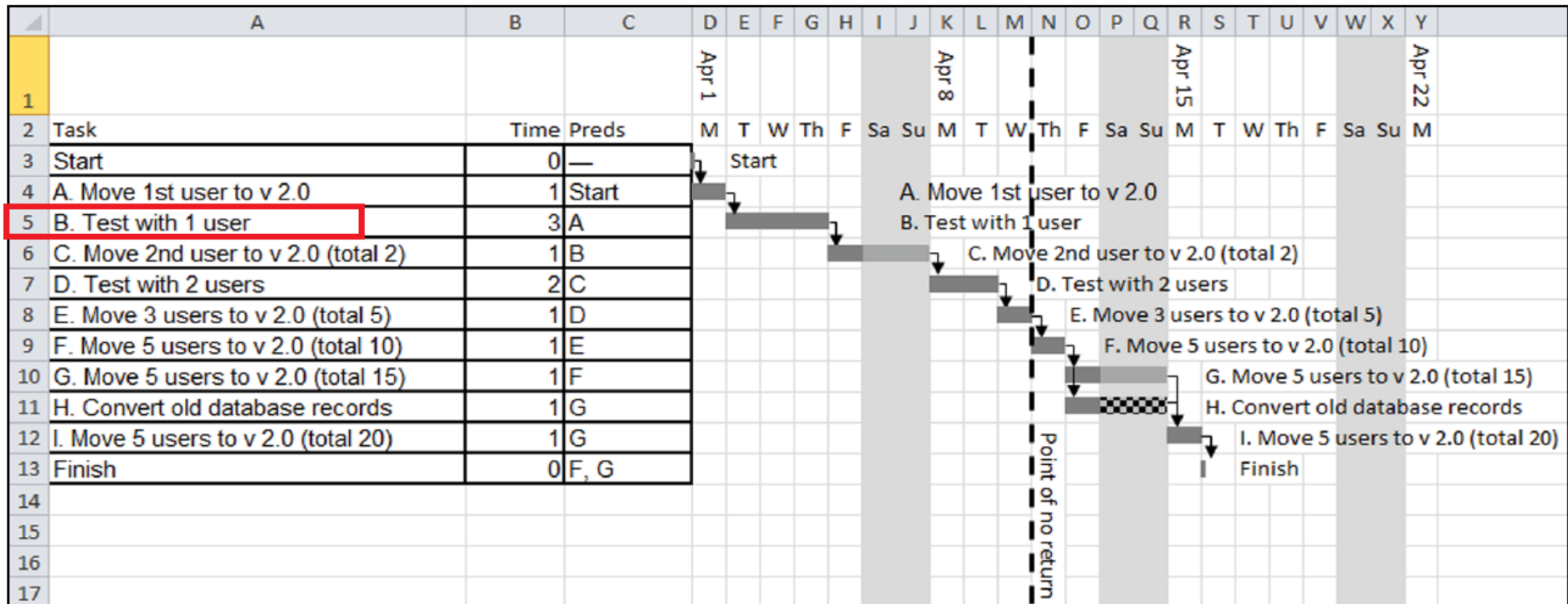
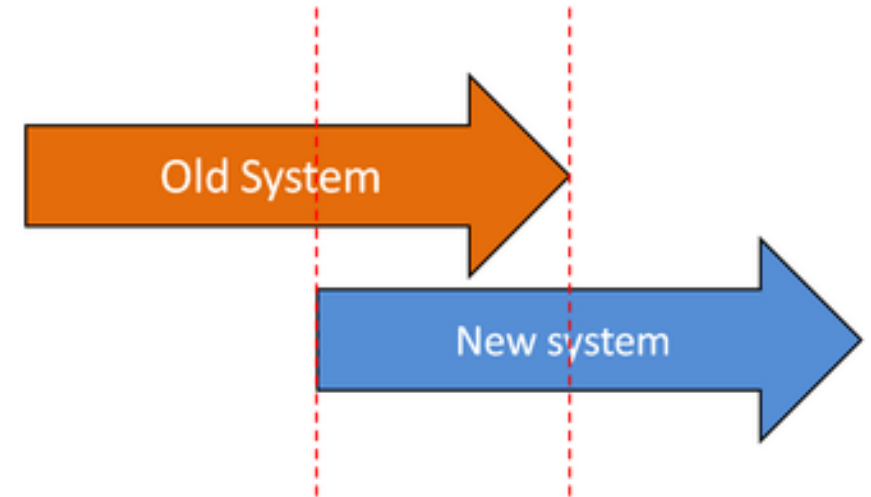


FIGURE 9-1: This schedule takes 11 work days to migrate all 20 users to AdventureTrek 2.0.

# Deployment strategy – cont.

- Parallel deployment
  - Parallel deployment is a strategy for software deployment where a new software system slowly assumes the roles of the older software system while both software systems **operate simultaneously**.
- Pros:
  - Different versions run in parallel
  - Zero down-time release
- Cons:
  - Difficult to configure for online releases



# Deployment strategy – cont.

- Incremental deployment
  - Incremental deployment is **the process of releasing the new features of software to the user machines gradually.**
- Pros:
  - Low risks
- Cons:
  - Slow rollout
  - Do not work with monolithic software
- Under design and development.

State 0



State 1



State 2



Final State



Microsoft Azure resource manager

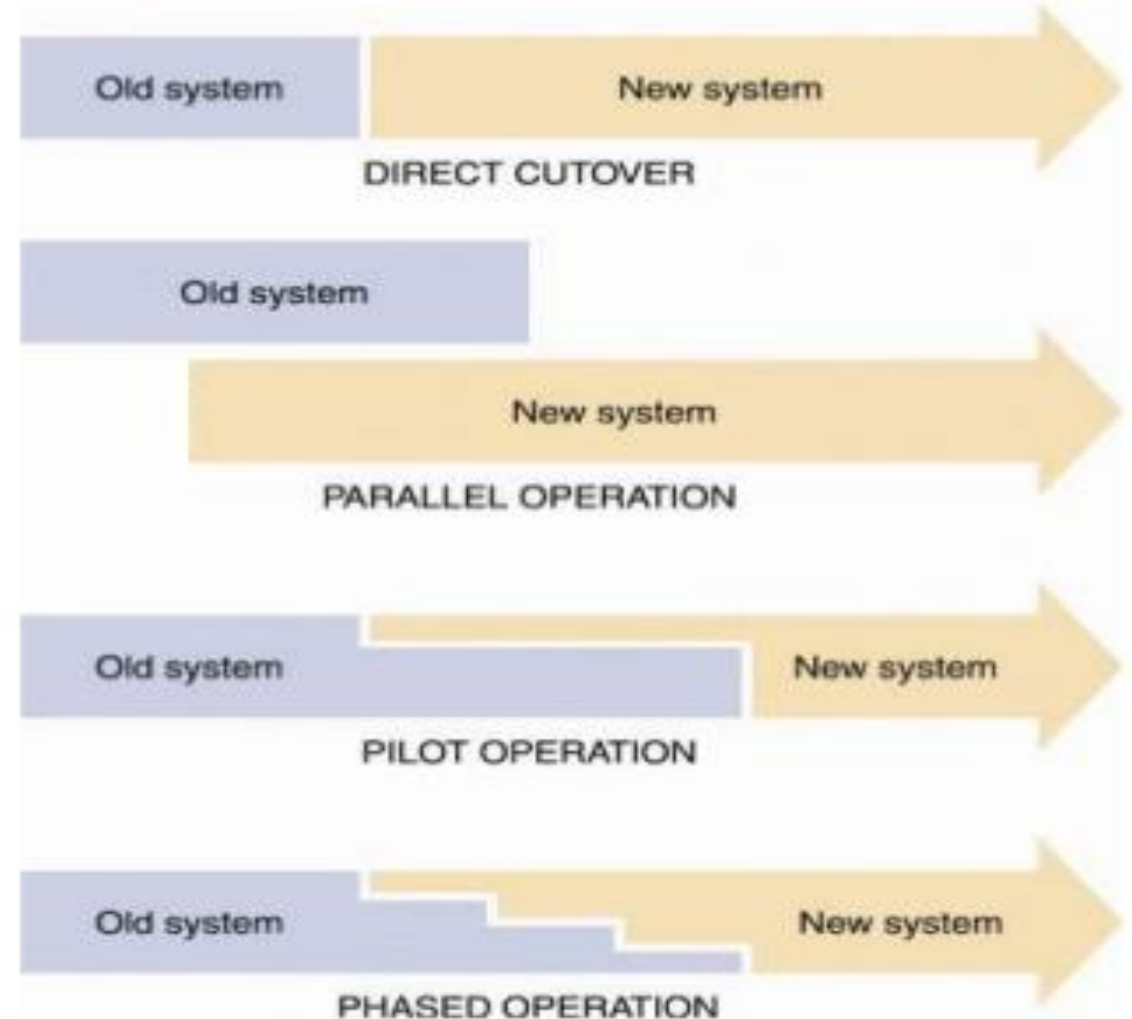
# Deployment strategy – cont.

Strategy	ZERO DOWNTIME	ROLLBACK DURATION	NEGATIVE IMPACT ON USER	COMPLEXITY OF SETUP
Cutover	✗	■ ■ ■	■ ■ ■	□ □ □
Stage	✗	■ ■ □	■ □ □	■ ■ □
Gradual cutover	✓	■ □ □	■ □ □	■ □ □
Parallel	✓	□ □ □	■ ■ □	■ ■ □
Increment	✓	■ □ □	■ □ □	■ ■ ■



# Deployment strategy – cont.

- Another names
  - Direct cutover
    - Recreate
  - Parallel operation
    - Blue/Green
  - Pilot operation: gradual cutover
- Phased operation: incremental
  - Ramped



# Deployment mistakes

- Assume everything will work
  - Cutover deployment
- Have no rollback plan
- Allow insufficient time
- Skip staging
  - Complicated (safety critical) deployments, staged deployment is necessary
- Install lots of updates all at once
- Use an unstable environment

# Summary

- Deployment
  - Concepts
- Types of software deployments
- Deployment tasks
  - Plan, testing, document, training
- Deployment plan
- Deployment strategies
  - Cutover, staged deployment, gradual cutover, parallel, increment
- Deployment mistakes

# Announcement

- Group project
  - Complete the SDD first
  - Based on the SDD implement the software code
  - Prepare the presentation
    - Presentation PPT needs to deliver to myls
  - The presentation should include
    - **3 minutes theory and 3 minutes demonstration**