University of Southampton

COMP3219 Week 6.3 Project Scheduling

Dr Haiming Liu

h.liu@soton.ac.uk

Text book

- Pinto, J (2019) Project Management: Achieving Competitive Advantage. 5th ed. Harlow: Pearson ---- Chapter 9

Project Scheduling

- Project Scheduling is an output of a schedule model that presents linked activities with planned dates, durations, milestones, and resources.

- Project scheduling represents the conversion of project goals into an achievable methodology for their completion.

- Project scheduling creates a timetable and reveals the network logic that relates project activities to each other in a coherent fashion.
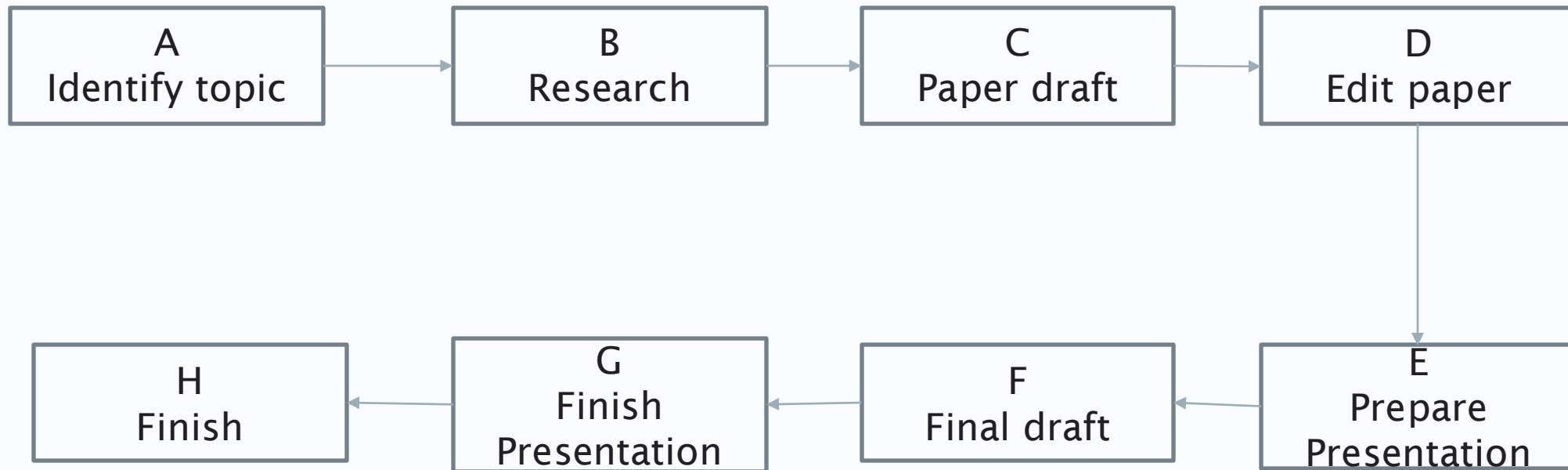
A Project/Case

- Suppose you and your classroom team were given an assignment on emerging technologies and were expected to turn in a paper and give a presentation at the end of the semester.
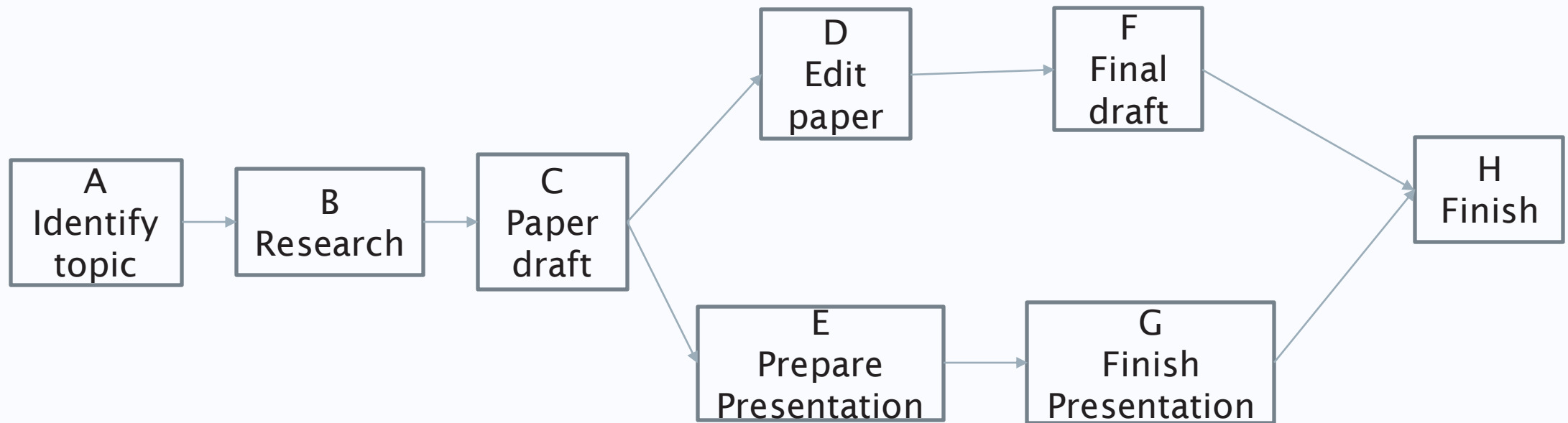
Work Breakdown Structure

A. Identify topic

B. Research topic

C. Write first draft of paper

D. Edit and rewrite paper

E. Prepare class presentation

F. Complete final draft

G. Complete presentation

H. Hand in paper and present topic in class

Network Diagram – Serial Sequential Logic

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│      A       │ ───▶ │      B       │ ───▶ │      C       │ ───▶ │      D       │
│ Identify topic│      │  Research    │      │  Paper draft │      │  Edit paper  │
└──────────────┘      └──────────────┘      └──────────────┘      └──────────────┘
                                                                         │
                                                                         ▼
┌──────────────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│      H       │ ◀─── │      G       │ ◀─── │      F       │ ◀─── │      E       │
│   Finish     │      │   Finish     │      │ Final draft  │      │   Prepare    │
│              │      │ Presentation │      │              │      │ Presentation │
└──────────────┘      └──────────────┘      └──────────────┘      └──────────────┘
```
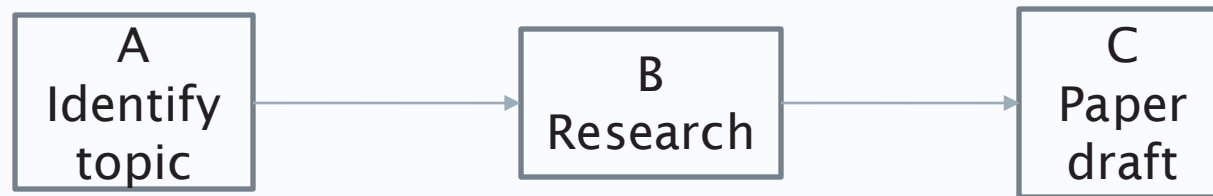
Network Diagram – Nonserial Sequential Logic

Two Activity Networks Constructing Methods

- Activity-on-Arrow (AOA)

  – The arrow represents a task, or activity and the node signifies an event marker that suggests the completion of one activity and the potential to start the next.

- Activity-on-Node (AON)

  – The node represent an activity and the path arrows demonstrate the logical sequencing from node to node through the network.

- AOA was popular several decades ago. AON is preferred now by the computer-based scheduling programs.

Developing A Network Diagram – An Activity Node

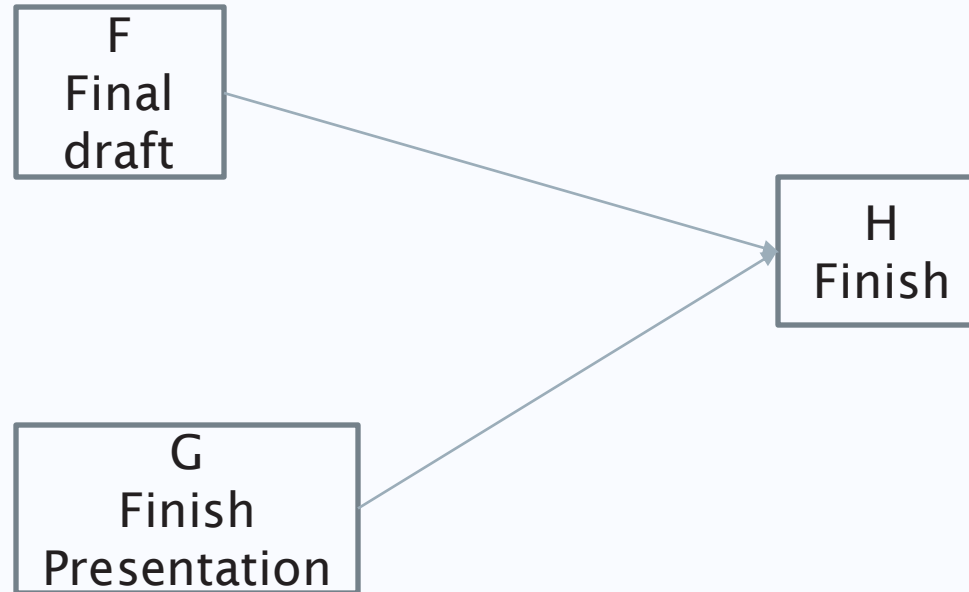| Early Start	Identifier Number	Early Finish
Activity Float/Slack	Activity Descriptor	
Late Start	Activity Duration	Late Finish

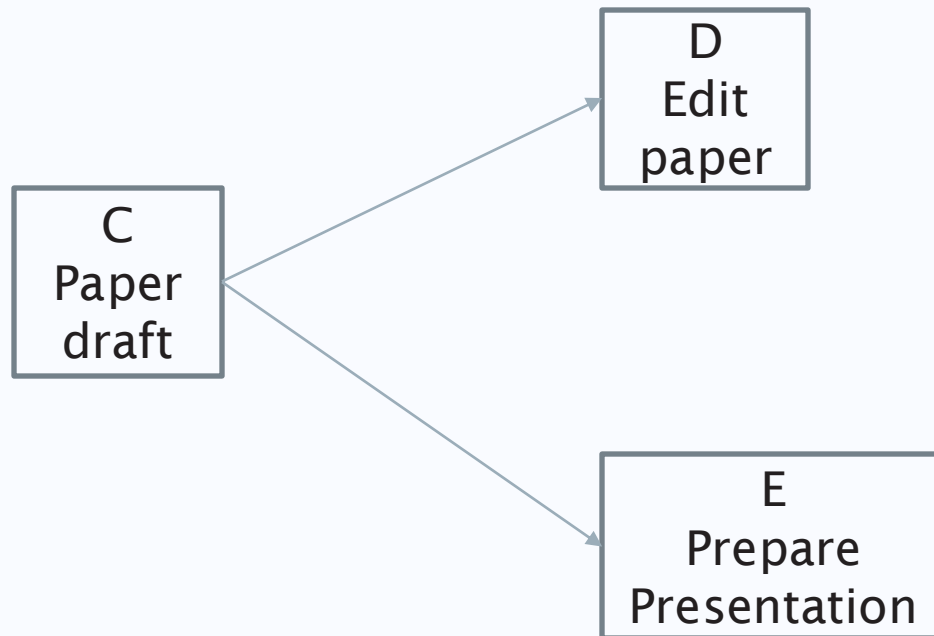# Developing A Network Diagram – Activities Linked In Series

Developing A Network Diagram – Activities Linked In Parallel (Concurrent)
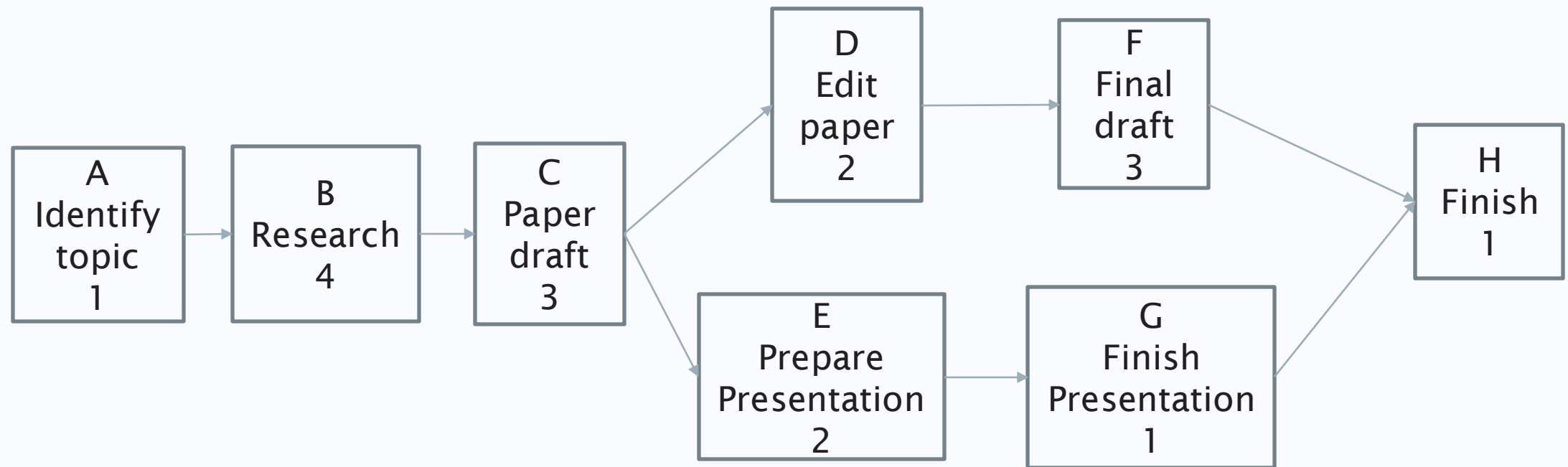
Developing A Network Diagram – Merge Activities

Developing A Network Diagram – Burst Activities

Developing A Network Diagram – Duration Estimation
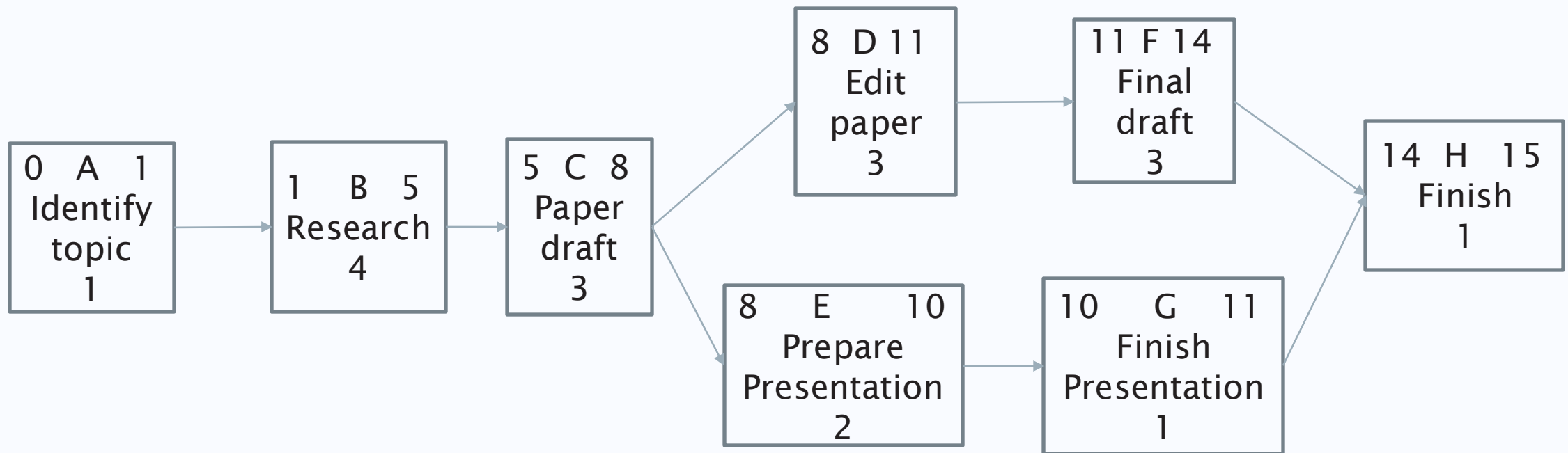
- Duration Estimation:
  - Is based on what is assumed to be normal
  - Is always somewhat uncertain
  - Can vary from several hours for short projects to days and weeks for longer projects
- Activity durations are estimated based on:
  - Experience
  - Expert opinion
  - Mathematical derivation (P.348, Pinto, 2019)
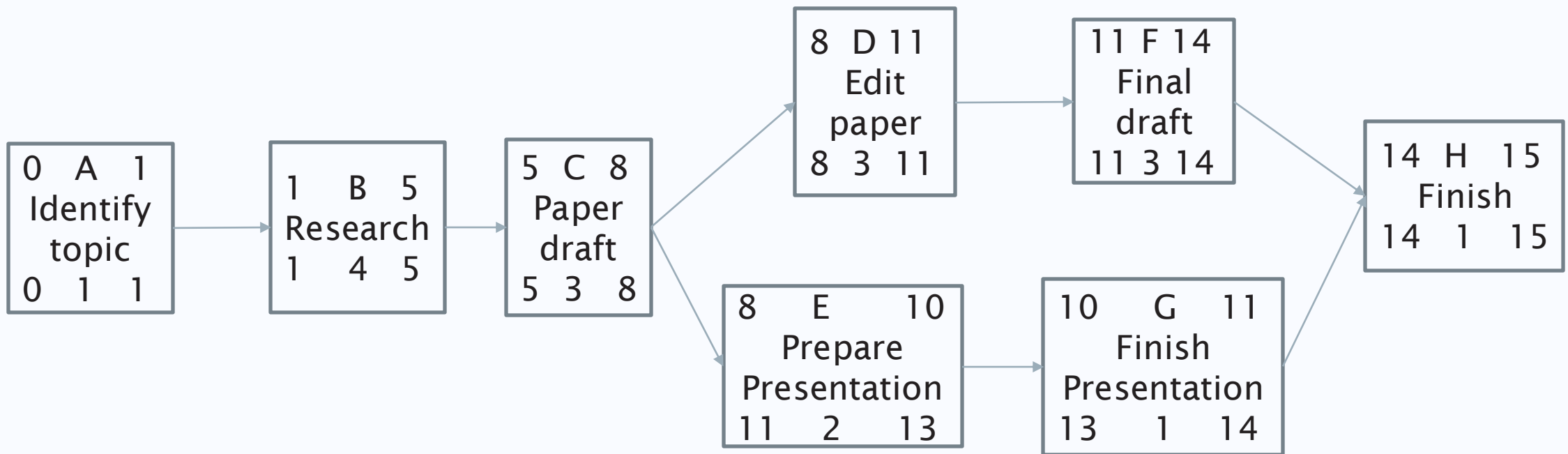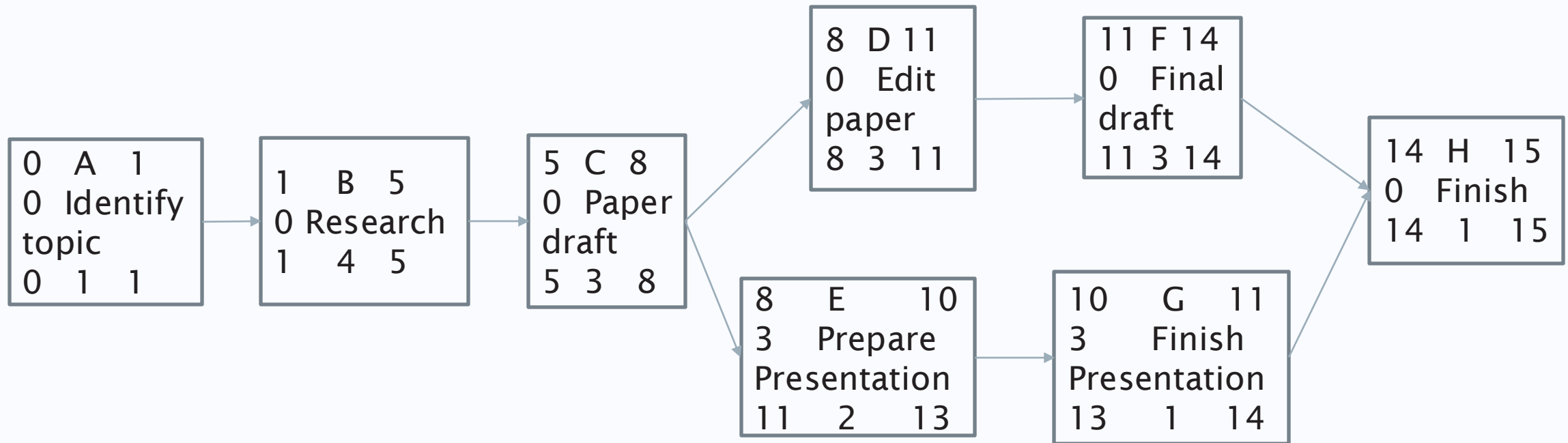
Constructing The Critical Path

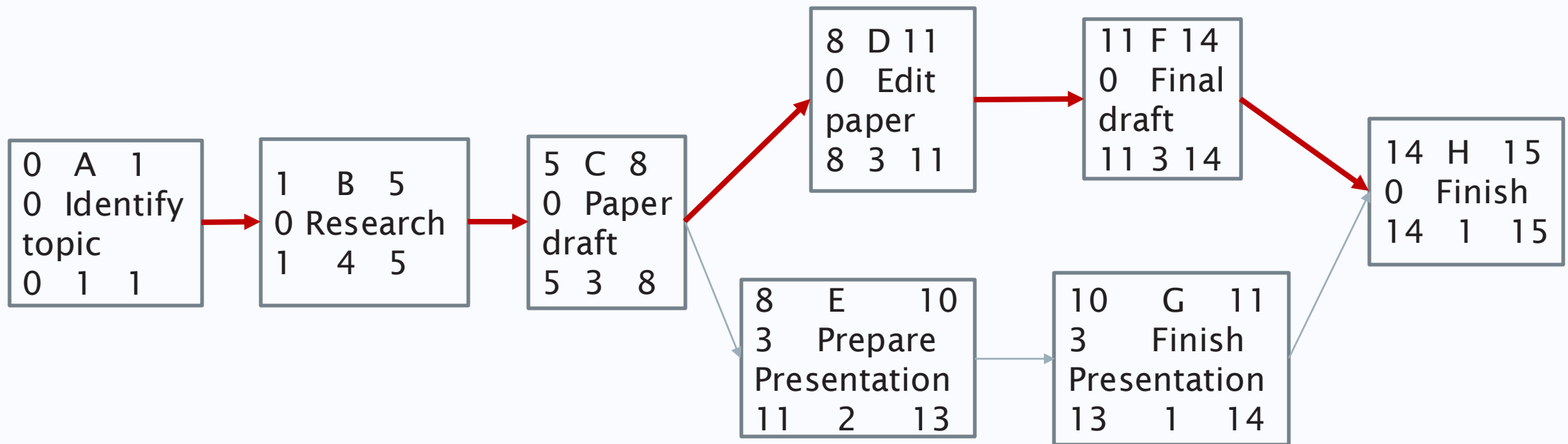# Constructing The Critical Path – The Forward Pass

Constructing The Critical Path – The Backward Pass

Constructing The Critical Path – The Float/Slack


```
0   A   1
0   Identify
topic
0   1   1
```

```
1   B   5
0 Research
1   4   5
```

```
5   C   8
0   Paper
draft
5   3   8
```

```
8   D 11
0   Edit
paper
8   3   11
```

```
11 F 14
0   Final
draft
11 3 14
```

```
14  H   15
0   Finish
14  1   15
```

```
8   E   10
3   Prepare
Presentation
11  2   13
```

```
10    G   11
3     Finish
Presentation
13   1   14
```

Constructing The Critical Path – The Critical Path

Terminology

- Critical path is the path through the project network with the longest duration. The critical path may change from time to time as activities are completed ahead of or behind schedule. Critical path activities are identified as having zero float in the project.

- Activity float is determined as a result of performing the forward and backword passes through the network.

- More key scheduling terminologies can be found on P. 339 (Pinto, 2019)

Steps to Reduce The Critical Path

- Eliminate tasks on the critical path

- Re-plan serial paths to be in parallel

- Overlap sequential tasks

- Shorten the duration of critical path tasks

- Shorten early tasks

- Shorten longest tasks

- Shorten easiest tasks

- Shorten tasks that cost the least to speed up.