

# **Activity Networks And Gantt Charts**

**(Session 3 in the Project Planning And Management Module)**

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# Review of Session 1 & 2

- **Project planning and management important**
- **Plan and monitor 3 S's**
  - **Scope (goals)**
  - **Spending (resources)**
  - **Schedule (time)**
- **Tools for planning and monitoring projects**
  - **Work Breakdown Structure (WBS)**
    - **Identifies “manageable” tasks**
      - **“Manageable” task – estimate time & resources requirements**
  - **Linear Responsibility Chart (LRC)**
    - **Assign responsibility for all “manageable” tasks**

# **Learning Objectives -- Session 3**

- **Students should be able to**
  - **Define, describe, and use**
    - **Activity network**
    - **Gantt chart**
  - **Define**
    - **Schedule**
    - **PERT chart**
    - **Budget**
    - **Percent completion matrix**

# **Activity Networks**

# Activity Network

- **In activity network**
    - **Tasks treated as activities**
    - **Task completions treated as event**
  - **Construct a network with**
    - **Nodes or blocks**
    - **Arcs or connecting lines**
  - **Interpretation**
    - **Blocks represents activities (tasks)**
    - **Connecting lines represents events (task completions)**
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- **Note some approaches use the opposite interpretation**
  - **Tasks (or activities) on connecting lines**
  - **Task completions (or events) in blocks**

# Simplified Process for Creating Activity Network

- List all tasks in WBS
- Identify
  - Non-reduced (“manageable”) tasks
  - Reduced (“complex”) tasks
- Indicate estimated time required for “manageable” tasks
- Note all dependencies between “manageable” tasks
- For “manageable” tasks, identify

or “manageable” tasks. Identify

# **Simplified Process for Creating Activity Network -- Continued**

- **Construct multicolumn table of “manageable” tasks**
  - **1<sup>st</sup> column – all independent tasks**
  - **2<sup>nd</sup> column –tasks dependent on 1<sup>st</sup> column tasks**
  - **3<sup>rd</sup> column -- tasks dependent on 1<sup>st</sup> & 2<sup>nd</sup> column tasks**
  - **Continue until all “manageable” tasks listed**
- **Convent to a block diagram**
  - **Add “Start Task” & “End Task” blocks**
- **Include estimates of required completion times**

# Preparing Meal Example

## WBS With Estimated Times

- 1.0 Prepare meal ----- (Complex task)
  - 1.1 Cook soup ----- (Manageable task -- 35 min)
  - 1.2 Cook chicken, rice, and sauce ----- (Complex task)
    - 1.2.1 Boil rice ----- (Manageable task -- 30 min)
    - 1.2.2 Brown chicken ----- (Manageable task -- 15 min)
    - 1.2.3 Prepare sauce ----- (Manageable task -- 5 min)
    - 1.2.4 Bake chicken, rice, and sauce ---- (Manageable task -- 15 min)
  - 1.3 Boil peas ----- (Manageable task -- 15 min)
  - 1.4 Open wine and let it breathe ----- (Complex task)
    - 1.4.1 Open wine ----- (Manageable task -- 5min)
    - 1.4.2 Wine breathe ----- (Manageable task -- 30 min)
- 2.0 Eat meal ----- (Complex task)
  - 2.1 Eat soup ----- (Manageable task -- 15 min)
  - 2.2 Eat entrée ----- (Manageable task -- 25 min)



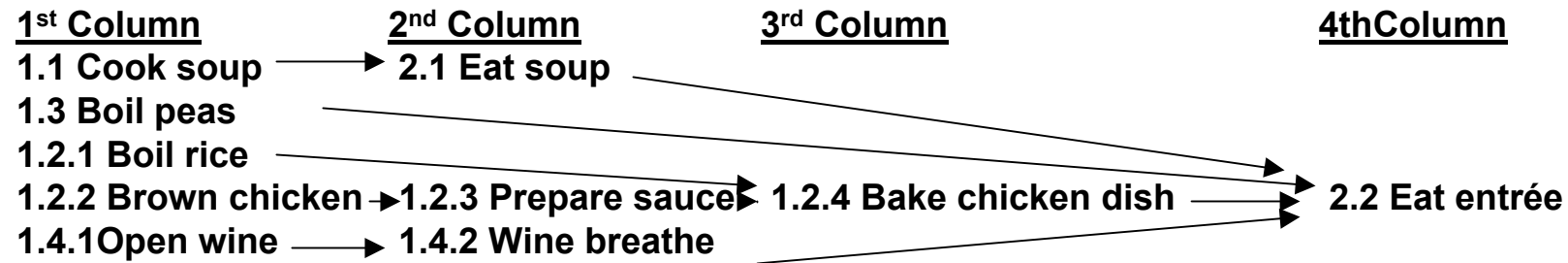
# Preparing Meal Example

## Dependencies Between “Manageable” Tasks

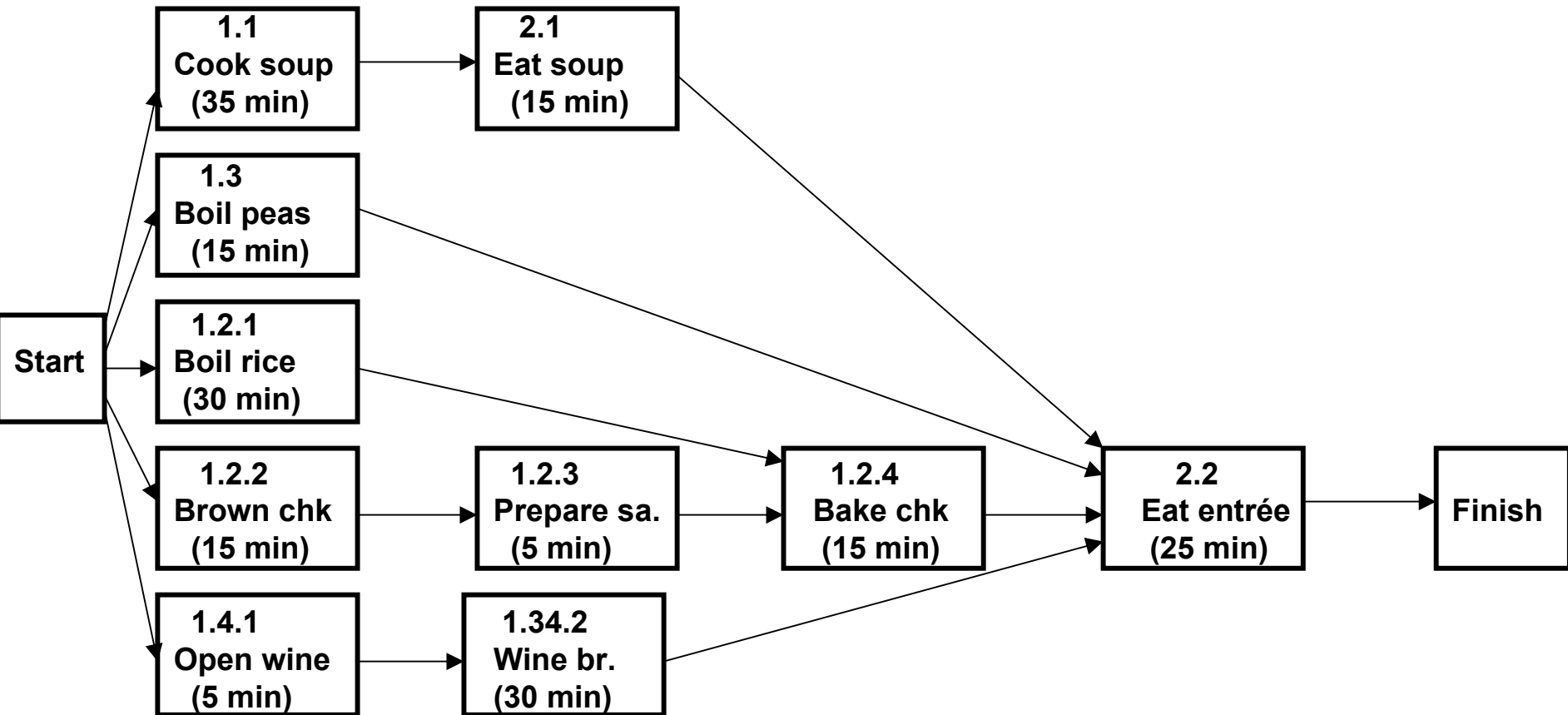
- 1.1 Cook soup (35 min) ----- Independent
- 1.2.1 Boil rice (30 min) ----- Independent
- 1.2.2 Brown chicken (15 min) ----- Independent
- 1.2.3 Prepare sauce (5 min) ----- Depends on 1.2.2
- 1.2.4 Bake chicken dish (15 min) -- Depends on 1.2.1, 1.2.3
- 1.3 Boil peas (15 min) ----- Independent
- 1.4.1 Open wine (5min) ----- Independent
- 1.4.2 Wine breathe (30 min) ----- Depends 1.3.1
- 2.1 Eat soup (15 min) ----- Depends on 1.1
- 2.2 Eat entrée (25 min) ----- Depends on 1.2.4, 1.3, 1.4.2, 2.1

# Preparing Meal Example

## Dependencies Between “Manageable” Tasks



# Preparing Meal Example Activity Network



# Activity Network – Team Exercise

- **Task** -- Construct a AN for an assigned problem
  - Use the WBS developed earlier
- **Process** -- Work as a team
  - Individual brainstorming (2 minutes)
  - Building consensus (5 minutes)
  - Reporting results (2 minutes)
    - Randomly selected individuals report team's AN

# **Gantt Charts**

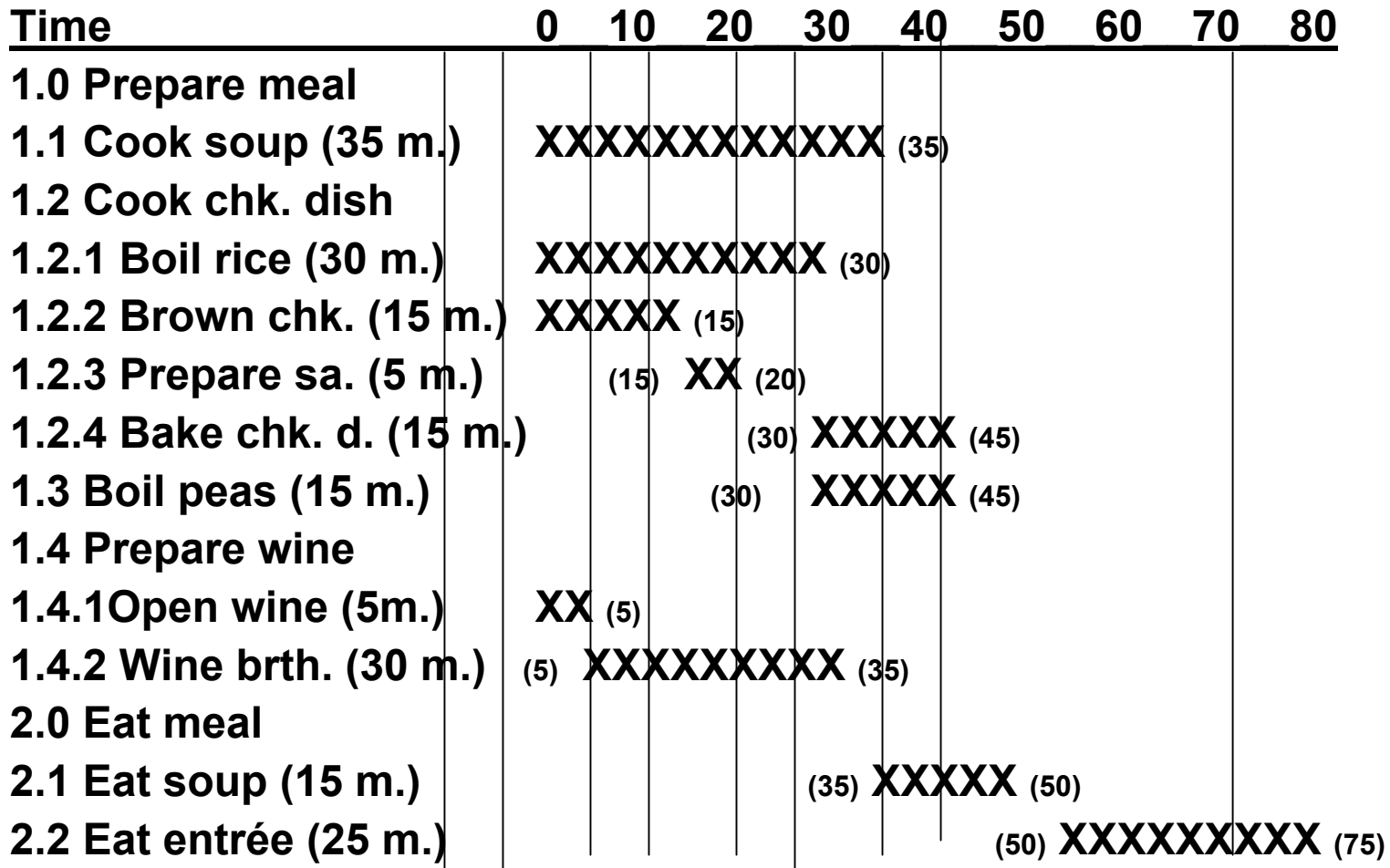
# Gantt Charts

- **Bar graph showing start and end times of each activity**
  - **Vertical axis list tasks**
  - **Horizontal axis shows time**
- **Derived from activity network with completion times**
- **Includes resource constraints**
  - **Manpower constraints**
  - **Limited resource constraints**

# **Simplified Process For Drawing Gantt Charts**

- **List all tasks on vertical axis**
  - **Use hierarchical format**
- **Schedule “manageable” independent tasks first**
  - **Limited resource or manpower constraints may limit number of simultaneous tasks**
  - **Delay tasks with least dependencies**
- **Schedule “manageable” dependent tasks**
  - **Again limited resources or manpower constraints may delay some tasks**
- **Repeat for each task level**
- **Iteratively adjust the schedule to meet all external deadlines and resource constraints**

# Gantt Chart -- Example



Cooking peas must be delayed because both pots are used for soup and rice.



# Gantt Chart – Team Exercise

- **Task** -- Construct a GC for an assigned problem
  - Use the AN and WBS developed earlier
- **Process** -- Work as a team
  - Individual brainstorming (2 minutes)
  - Building consensus (5 minutes)
  - Reporting results (2 minutes)
    - Randomly selected individuals report team's Gantt Chart

# Other Tools

- **Scheduling calendars**
  - Standard calendar with project deadlines inserted
- **Budget**
  - Itemized listing of resources (including manpower) required for each task
- **PERT chart**
  - PERT (Program Evaluation and Review Technique)
  - Diagram similar to the Gantt chart showing task dependencies and scheduling
- **Percent completion matrix**
  - List of all tasks showing percent of resources expended along with the percent of the task completed

# **Commercial Project Management Software**

- **Microsoft Project**
- **Primavera**