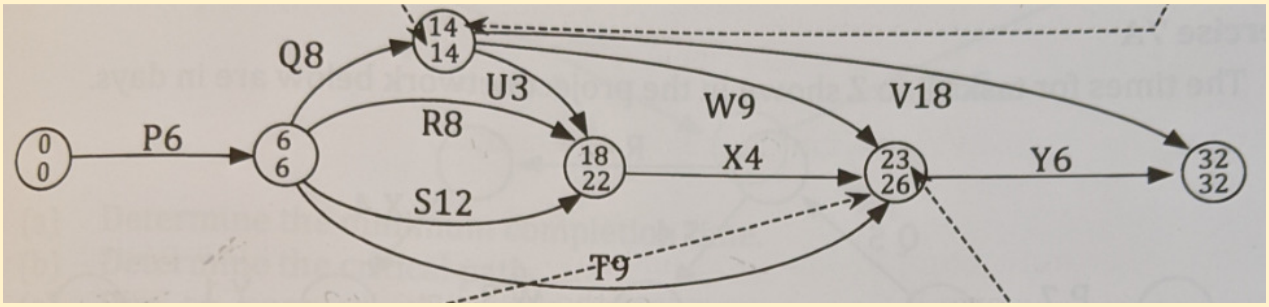
Sadler:

2. **Backward scan.** I.e. backtrack through the network recording the latest time each vertex could be reached without delaying the minimum completion time. In this way we consider the **latest start time** (LST) of an activity.

This approach is demonstrated in the following example.

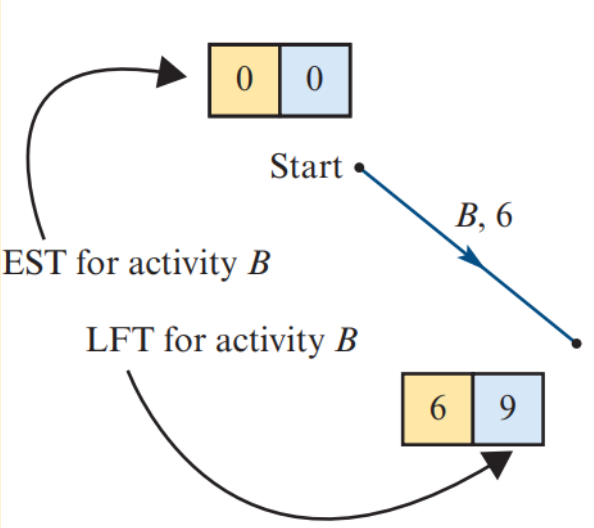


Consider task W. It has an **earliest start time** (EST) of 14 hours and a **latest start time** (LST) of 17 hours (26 – 9). W has 3 hours float.

Cambridge University Press:

To complete the analysis, latest finishing time (LFT) values need to be calculated for each activity.

LFT values are determined using a process called **backward scanning**.



EST values are in the left cell at the start of each activity.

LFT values are in the right cell at the end of each activity.

LST = LFT − duration

Float = LST − EST

Critical activities will have zero float; that is, LST = EST

Critical Path Analysis

UNSW Sydney

This course covers MS-N3 Critical Path Analysis from the Australian Mathematics Standard syllabus.

- Construct a network to represent the duration and interdependencies of activities that must be completed during a particular project.
- Use forward scanning to determine the Earliest Starting Time (EST) of an activity
- Use backward scanning to determine the Latest Finishing Time (LFT) of an activity
- Use the EST and LFT to find the critical path.
- Determine minimum time of a particular project.
- Calculate float time of an activity.
- Solve small-scale network flow problems using the 'maximum-flow/minimum-cut' theorem.

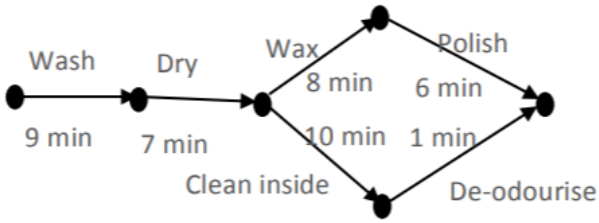
Jacaranda/Math Quest (and also Nelson):

To complete critical path analysis, a procedure called *backward scanning* must be performed. In forward scanning, we record the *earliest start time* for an activity in the left-hand side of each vertex; in backward scanning, we record the *latest start time* in the *right-hand side* of each vertex — that is, the latest time that this activity can start without delaying the project.

***Latest finish time* for an activity is equal to the latest start time of the following activity.**
***Float time* is the maximum time that an activity can be delayed without delaying a subsequent activity on the critical path and thus affecting the earliest completion time.**

Float time = latest finish time − earliest start time − activity time

ACARA and WACE Glossary



Critical path analysis is a method for determining the longest path (the **critical path**) in such a network and hence the minimum time in which the project can be completed. There may be more that one critical path in the network. In this project the critical path is 'Wash-Dry-Wax-Polish' with a total completion time of 30 minutes.

The **earliest starting time (EST)** of an activity 'Polish' is 24 minutes because activities 'Wash', 'Dry' and 'Wax' must be completed first. The process of systematically determining earliest starting times is called **forward scanning.**

The shortest time that the project can be completed is 30 minutes. Thus, the **latest starting time (LST)** for the activity 'De-odourise' is 29 minutes. The process of systematically determining latest starting times is called **backward scanning**.