

Planning and Acting in the Real World

- *Planning and scheduling the operations*
 - Spacecraft
 - Factories
 - Military campaigns

CONT...

- **Time, Schedules, and Resources**
- Classical planning representation is about
 - *What to do*
 - *In what order*
 - *Cannot talk about time*
 - How long an action takes
 - When the action occurs

CONT...

- Planning to produce schedules
 - *Assign initial and final times*
 - *Schedule for an airline, assign planes to flights, departure and arrival times*
- Resource constraints
 - *Limited number of staff in an airline (i.e. pilots)*
 - *Staff cannot be in two places at the same time*
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CONT...

- **A job-shop scheduling problem**
 - *Consists of a set of **jobs***
 - Each job consists of a set of **actions**
 - *Actions have ordering constraints among them*
 - *Actions (each of them) have a **duration** and a set of **resource constraints***

CONT...

Jobs($\{AddEngine1 \prec AddWheels1 \prec Inspect1\}$,
 $\{AddEngine2 \prec AddWheels2 \prec Inspect2\}$)

Resources(*EngineHoists*(1), *WheelStations*(1), *Inspectors*(2), *LugNuts*(500))

Action(*AddEngine1*, DURATION:30,
USE: *EngineHoists*(1))

Action(*AddEngine2*, DURATION:60,
USE: *EngineHoists*(1))

Action(*AddWheels1*, DURATION:30,
CONSUME: *LugNuts*(20), USE: *WheelStations*(1))

Action(*AddWheels2*, DURATION:15,
CONSUME: *LugNuts*(20), USE: *WheelStations*(1))

Action(*Inspect_i*, DURATION:10,
USE: *Inspectors*(1))

Figure 1 A job-shop scheduling problem for assembling two cars, with resource constraints. The notation $A \prec B$ means that action A must precede action B .