“Shuffling Cards”
Simple Story Modelling for Planning

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Overview

1. Basics

2. Demonstration:
   Card Game (James Bond Parody)
1. Basics

**initial state**

**goal state**

**H O W ?**

all possible actions

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1. Basics

PLANNING is the search for a SEQUENCE OF ACTIONS that transforms an INITIAL WORLD STATE into a desired GOAL STATE.
1. Basics

PLANNING is the search for a **SEQUENCE OF ACTIONS** that transforms an **INITIAL WORLD STATE** into a desired **GOAL STATE**.
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1. Basics

PROPOSITIONS are facts.

- P01 helpless woman
- P02 woman has cigarette in hand
- P03 cigarette is not lighted
1. Basics

A STATE describes the current situation of the world with PROPOSITIONS.

PROPOSITIONS are facts.

STATE

- P02 woman has cigarette in hand
- P01 helpless woman
- P03 cigarette is not lighted
1. Basics

A STATE describes the current situation of the world with PROPOSITIONS.

PROPOSITIONS are facts.

- P01 helpless woman
- P02 woman has cigarette in hand
- P03 cigarette is not lighted
An ACTION can change one STATE into another STATE.

P01 helpless woman
P02 woman has cigarette in hand
P03 cigarette is not lighted

A01 Harold lights cigarette with a match

P01 helpless woman
P02 woman has cigarette in hand
P04 cigarette is lighted

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1. Basics

STATE BEFORE

P01
P02
P03

A01
ADD
DEL
P04
P03

STATE AFTER

P01
P02
P04

Action 01

ACTION
(operator)

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1. Basics

Actions have PRECONDITIONS. PRECONDITIONS are PROPOSITIONS (= facts).
1. Basics

**PRE-CONDITIONS**
- Proposition 01

**ACTION** (operator)
- Action 01
  - ADD Proposition 04
  - DEL Proposition 03

**EFFECTS**
- ADD Proposition 04
- DEL Proposition 03

**STATE BEFORE**
- P01
- P02
- P03

**STATE AFTER**
- P01
- P02
- P04

**Inference:**

**ACTIONS** have **EFFECTS**, **EFFECTS** are **PROPOSITIONS** (= facts) and they can be **ADDED** and/or **DELETED**.
The Author creates ACTIONS, PRECONDITIONS and EFFECTS. The Planner creates STATES and the SEQUENCE OF ACTIONS during the planning process.
1. Basics

Special states are the **INITIAL STATE** (1) and **GOAL STATES** (min. 1). A **GOAL STATE** is defined by its **GOAL PROPOSITIONS** (goal facts).

Author defines: GOAL STATE X (P01, P02, P04)

Every state with matching **PROPOSITIONS** (facts) becomes a **GOAL STATE**.

STATE Y → GOAL STATE

State Z → NO GOAL STATE
(P2 is missing)
1. Basics

WHICH ACTIONS ARE POSSIBLE?

STATE 1

P01
P02
P03
P04

STATE 2

P01
A01
ADD P05
DEL P01

A02
ADD P05
DEL P01
P02
P08

P03
P04
P05
P02
1. Basics

**STATE 1**

Which action is preferred?

**STATE 2**

**STATE 3**

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2. Demonstration

CARD GAME
2. Demonstration

„Harold in trouble“ – a James Bond Parody Scenario

Dramatis personae

• evil Silvertoe, blackmails the world with start of killer satellite
• Mister Seven, top agent, has to open negotiations with Silvertoe (or stop him)
• Harold, Sevens clumsy temporary assistant and wannabe womanizer
• a lady, party guests and a (pitiful) poodle

WE ARE THE PLANNER
→ WE keep care of everybody and everything (the world, too) but Mister Seven

USER is Mister Seven
→ WE (the planner) cannot directly influence Mister Sevens actions

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2. Demonstration

„Harold in trouble“ – a James Bond Parody Scenario

Setting
• garden party in Silvertoes castle
• Mister Seven already begun negotiations with Silvertoe in corner of garden
• Harold is free to roam „But don’t do something stupid, Harold!“

Goal
• Silvertoe has to break off negotiations to create suspense
  → raise Silvertoes anger level from 0 to 3
  → WE let Harold do something stupid … and what about the poodle? 😊
Thank you!

And now: Let’s play!
Additional Examples

Example 1
Additional Examples

WORLD STATE
before Action 1

Proposition 1

Proposition 2

Proposition 3

Proposition 4

Proposition 5

PRECONDITIONS

OPERATION

EFFECTS (postconditions)

Proposition 1

Proposition 3

Action 1

ADD

PROP 6

DELETE

PROP 1

PROP 4
Additional Examples

WORLD STATE

Proposition 1

Proposition 2

Proposition 3

Proposition 4

Proposition 5

PRECONDITIONS

Operation

EFFECTS (postconditions)

Proposition 1

Proposition 3

Action 1

ADD

DELETE

Proposition 6

Proposition 1

Proposition 4
Additional Examples

WORLD STATE

Proposition 1

Proposition 2

Proposition 3

Proposition 4

Proposition 5

PRECONDITIONS

OPERATION

EFFECTS (postconditions)

Proposition 1

Proposition 3

Action 1

ADD

Proposition 6

DELETE

Proposition 1

Proposition 4
Additional Examples

WORLD STATE

Proposition 1

Proposition 2

Proposition 3

Proposition 4

Proposition 5

PRECONDITIONS

PROPOSITION 1

PROPOSITION 3

ACTION 1

OPERATION

ADD

DELETE

EFFECTS (postconditions)

PROPOSITION 6

PROPOSITION 1

PROPOSITION 4
Additional Examples

WORLD STATE

Proposition 1  Proposition 2  Proposition 3

Proposition 4  Proposition 5  Proposition 6

PRECONDITIONS  OPERATION  EFFECTS (postconditions)

Proposition 1  Action 1  Proposition 6

Proposition 3  ADD

DELETE

Proposition 1

Proposition 4
Additional Examples

WORLD STATE

- Proposition 1
- Proposition 2
- Proposition 3
- Proposition 4
- Proposition 5
- Proposition 6

PRECONDITIONS

- Proposition 1
- Proposition 3

OPERATION

Action 1

EFFECTS (postconditions)

- ADD
- DELETE

- Proposition 6
- Proposition 1
- Proposition 4
Additional Examples

WORLD STATE

Proposition 1
Proposition 2
Proposition 3
Proposition 4
Proposition 5
Proposition 6

PRECONDITIONS

Proposition 1
Proposition 3

OPERATION

Action 1

EFFECTS (postconditions)

ADD
Proposition 6

DELETE
Proposition 1
Proposition 4
Additional Examples

WORLD STATE after Action 1

Proposition 2
Proposition 3
Proposition 6
Proposition 5

PRECONDITIONS

Proposition 1
Proposition 3

OPERATION

Action 1

EFFECTS (postconditions)

ADD
Proposition 6
DELETE
Proposition 1
Proposition 4
Additional Examples

Example 2
Additional Examples

WORLD STATE
after Action 1

Proposition 2

Proposition 3

Proposition 6

Proposition 5

PRECONDITIONS

OPERATION

EFFECTS (postconditions)

Proposition 6

Proposition 1

Action 2

ADD

DELETE

Proposition 7

Proposition 1

Proposition 5
Additional Examples

WORLD STATE after Action 1

Proposition 2
Proposition 3
Proposition 6
Proposition 5

PRECONDITIONS
Proposition 6
Proposition 1

OPERATION
Action 2

EFFECTS (postconditions)
ADD
Proposition 7
DELETE
Proposition 1
Proposition 5
Additional Examples

WORLD STATE
after Action 1

Proposition 2
Proposition 3
Proposition 5
Proposition 6

PRECONDITIONS
Proposition 1
Proposition 6

OPERATION
Action 2

EFFECTS (postconditions)
ADD
DELETE
Proposition 7
Proposition 1
Proposition 5
Additional Examples

WORLD STATE
after Action 1

PRECONDITIONS
Proposition 1
Proposition 6

OPERATION
Action 2

EFFECTS (postconditions)
ADD
Proposition 7
DELETE
Proposition 1
Proposition 5

Proposition 2
Proposition 3
Proposition 5
Proposition 6