STATES

State: A complete description of a (partially solved) problem

Only relevant features should be included in this description

- e.g. Chess (checker) position and whose turn it is
- e.g. Partial design of a mechanical device

State Space: Set of all states

Goal: Set of desirable states

This set may be given:

- explicitly (e.g. 8–puzzle), OR
- implicitly: By an abstract property the goal states must satisfy (e.g. chess).

Initial State: Where to start

OPERATORS

- Operator: A function from states to states

  Operator is an action that transforms a state into another state.

  - e.g. Chess (checker) moves
  - e.g. Add a part to a design / determine the value of a parameter

- Not all operators may apply in a given state

  Precondition: Condition that a state must satisfy for the operator to apply.

  Postcondition: Condition that holds in a state after the operator is applied.

- There may be a cost associated with applying an operator to a state

PROBLEM DESCRIPTION AND PROBLEM SOLVING

PROBLEM DESCRIPTION =

Initial State(s)
+ Operator Set
+ Goal State(s)
+ (Cost) Constraints

SOLUTION TO A PROBLEM =

- When the goal is given explicitly:
  Sequence of operators from an initial state to a goal state satisfying the constraints
- When the goal is given implicitly:
  A goal state

CONTROL ISSUES

Control How to select operators.

Desirable properties:

1. Don't get stuck in a state
2. Find a solution if one exists (systematic)
3. Avoid combinatorial explosion
4. Look for important substates (subgoals)

Heuristic "Rule of thumb" to select an operator when several of them are applicable.

It may or may not help!