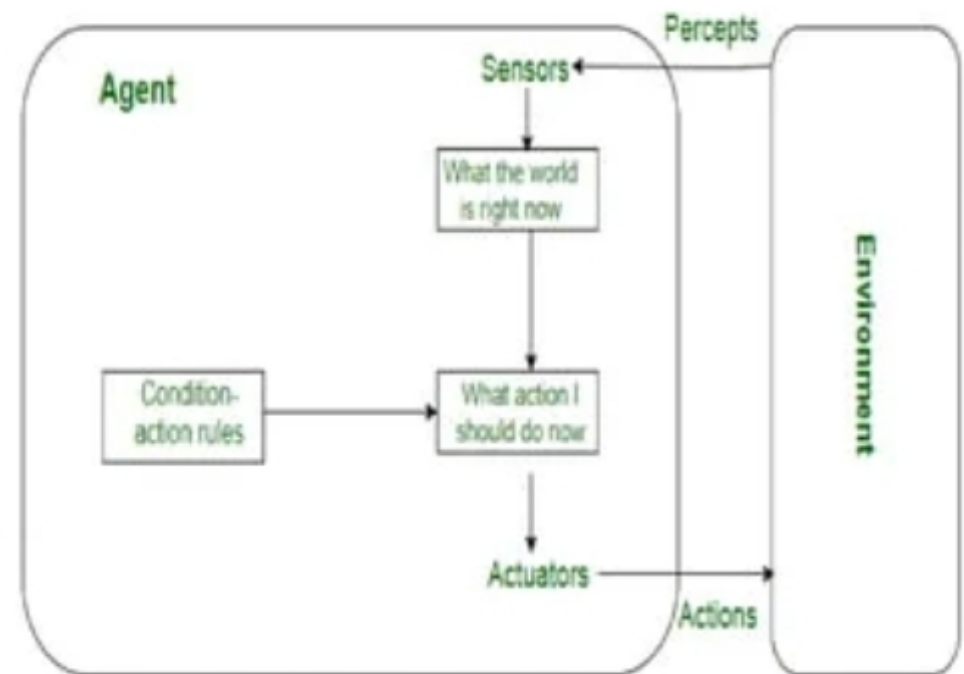# 1. Simple Reflex (SR) Agents

- No internal state, act only on the basis of current percept.
- Operate correctly only in fully observable environment.
- Simple functions are built based on sensory input ie. **condition action rule**.
- A boundary following robot is SR agent.

Simple Reflex (SR) Agents Limitations

- Very limited intelligence.
- Usually too big to generate and store.
- Not flexible, need to update the rules if any change occurs in environment.

2. Model Based Agents

- Find a rule whose condition matches the current situation.
- Handle **partially observable environments** by using model.
- The agent has **internal state**, adjusted by each percept and that depends on the percept history.
- **Current state** stored inside the agents, describing the part of the world which cannot be seen.
- Updating the state requires information about :
  - how the world evolves in-dependently from the agent, and
 - how the agent actions affects the world.

Model Based Reflex Agents
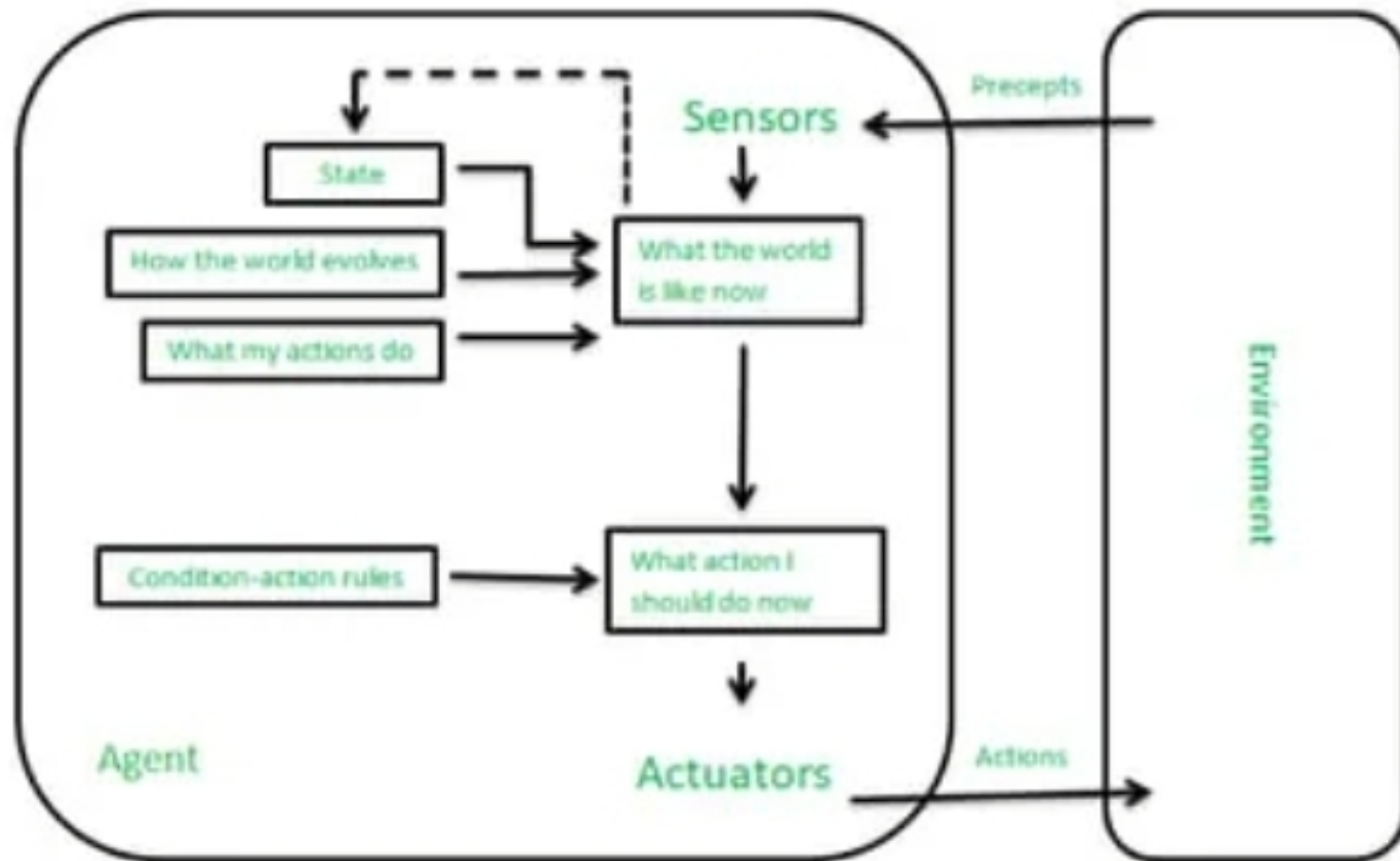
3. Goal Based Agents

- Extension of model based agents.

- Take decision based on how far they are currently from their **goal**.

- Every action is intended to reduce its distance from the goal.

- Agent choose a way among multiple possibilities, selecting the one which reaches a goal state.

- Searching and planning.

- Agent needs some sort of looking into future.

Goal Based Agents
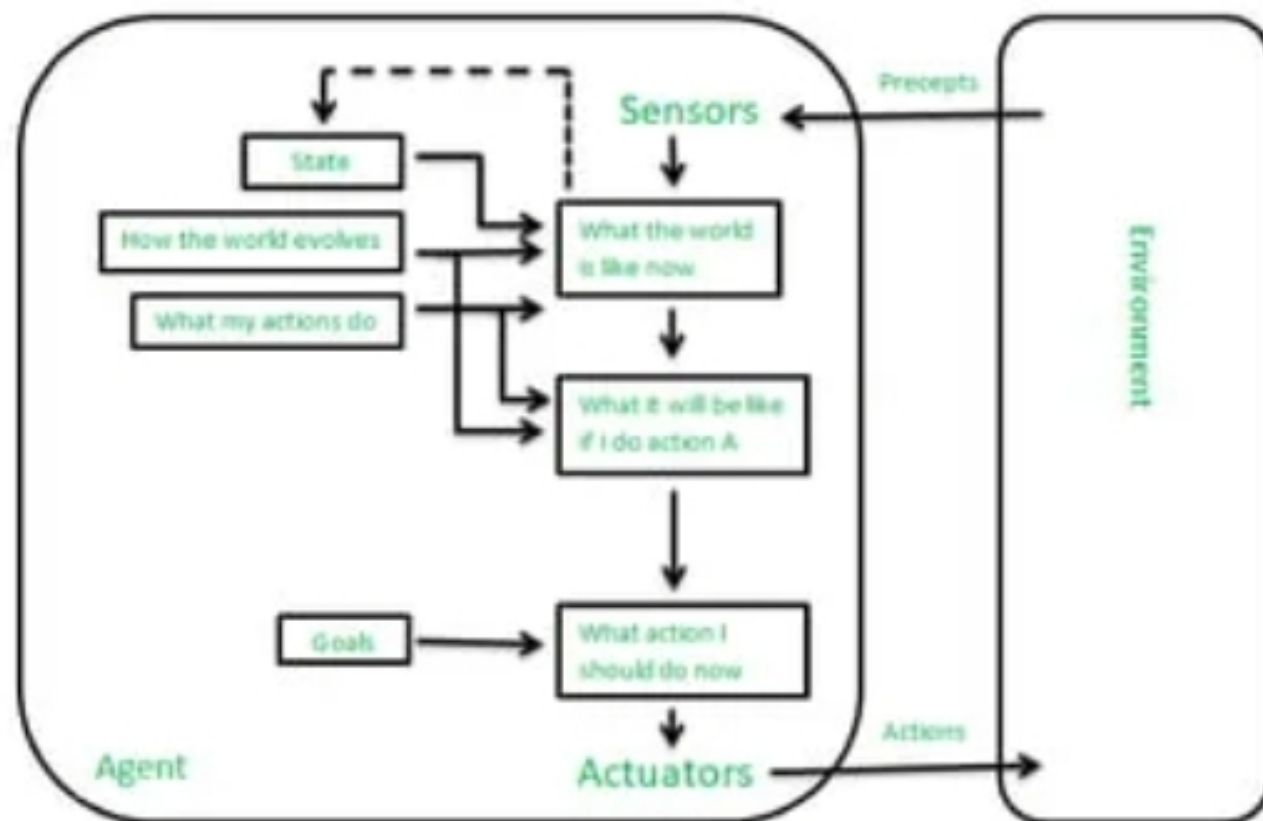
4. Utility Based Agents

- Main focus on utility not goal.
- Used when there are multiple possible alternatives
- Actions based on preference (Utility).
- Utility describes how happy the agent is.
- Agent chooses the action that maximize utility.
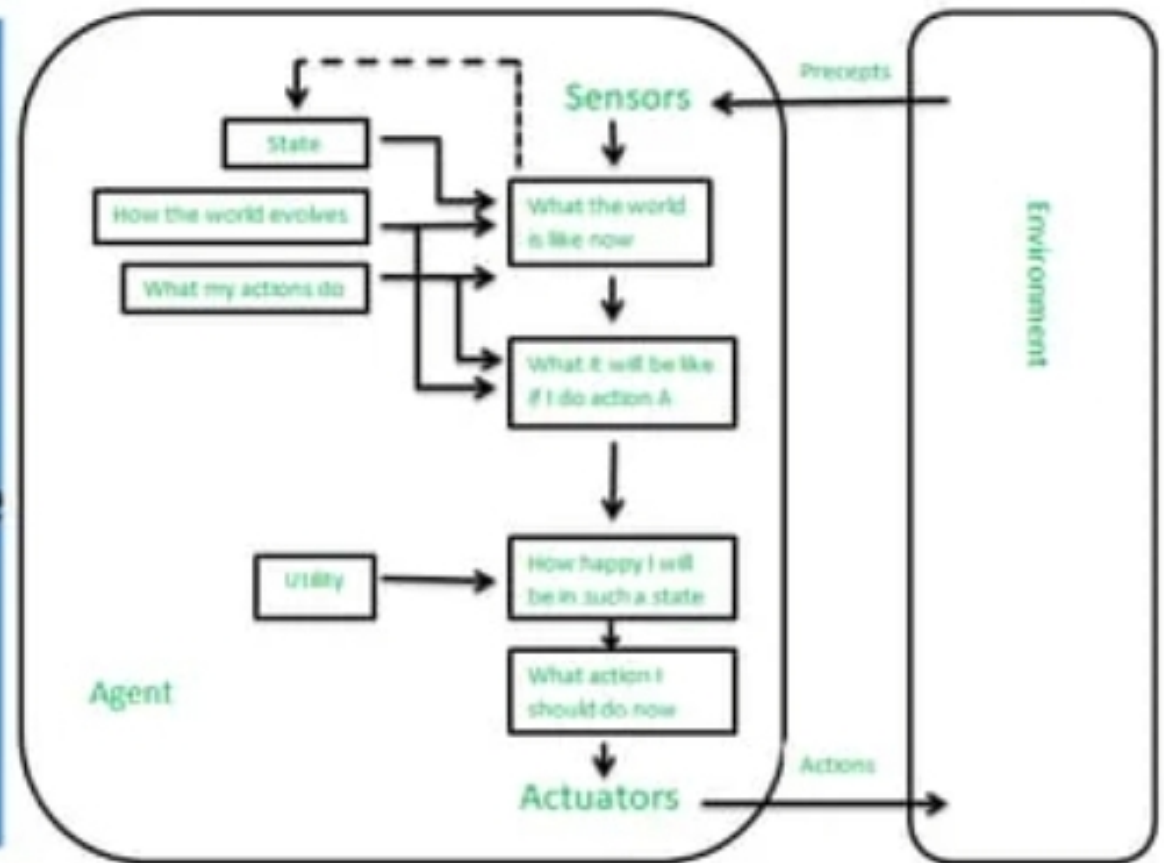
5. Learning Agent

- Learn from past experiences
- It start with knowledge then able to act and adapt automatically.
- It has 4 components

1. **Learning element**: It is responsible for making improvements by learning from the environment

2. **Critic:** Learning element takes feedback from critic which describes how well the agent is doing with respect to a **fixed performance standard.**

Learning Agent

3. Performance element: Responsible for selecting external action, based on percept and feedback from learning element .

4. Problem Generator: Suggest actions that will lead to new and informative experiences.
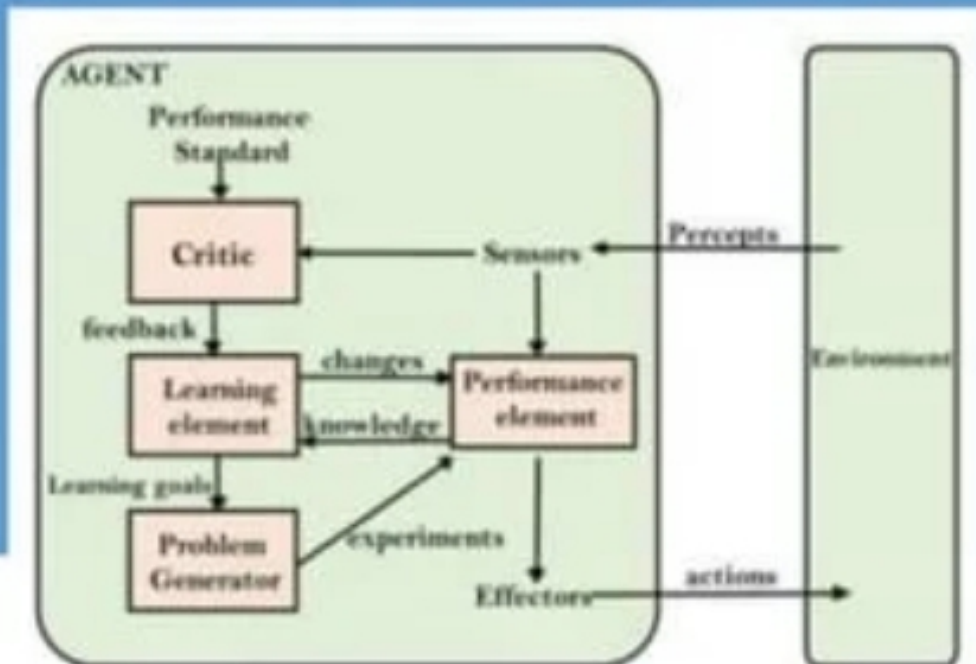
Different forms of learning

- **Rote learning or memorization.**
  - Least amount of inferencing.
  - Knowledge is copied in knowledge base.
- **Learning through instructions**
- **Learning by analogy**
  - Development of new concepts through already known similar concepts
- **Learning by induction**
  - Conclusion drawn based on large number of examples.

Different forms of learning

- **Learning by deduction**
  - Irrefutable form of reasoning.
  - Concepts drawn always already correct, if given facts are correct.

- **Learning based on feedback**
  - Supervised
  - Unsupervised
  - Reinforcement learning