



# **SNS COLLEGE OF ENGINEERING**

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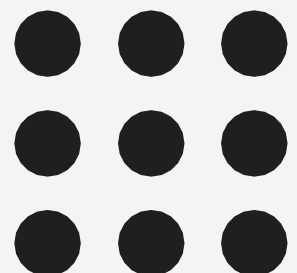
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**Department of Information Technology**  
**Course Name – Software Engineering**

**II Year / III Semester**

**Unit-3 Reasoning Under Uncertainty**





## Why Use Temporal Logic?

Requirements of concurrent, distributed, and reactive systems are often phrased as constraints on *sequences of events or states* or constraints on *execution paths*.

Temporal logic provides a formal, expressive, and compact notation for realizing such requirements.

The temporal logics we consider are also strongly tied to various computational frameworks (e.g., automata theory) which provides a foundation for building verification tools.



## Temporal Logic

- For a temporal representation to be successful, it must be embedded within a more general representation that can encode general assertions about the world.

$\text{Green}(\text{frog1}, t1)$

- $\text{frog1}$  is green at time  $t1$
- $\text{frog1}$  is green over the time interval  $t1$
- This technique does not work with all predicates
  - sun rose over the interval  $t1$  is not equivalent to saying sun rose at every interval in the interval  $t1$ .
- Such predicates take intervals as arguments---- $\text{Rise}(t1, t2)$



## Temporal Knowledge Representation Systems



- The RHET system developed at Rochester integrates a temporal reasoner to a general purpose reasoning system.
- It is a horn based AI representation language that has as a subcomponent the TIMELOGIC temporal reasoning system developed by Koomen and based on Allen's interval logic.
- RHET is a hybrid system, rather than using a single uniform proof technique, each predicate defined in RHET could potentially use its own specialized techniques for computing its truthhood.

$[A(x,y)] [B(x)] \Rightarrow [P(x,y)]$

### Temporal Knowledge Representation Systems (cont.)

- All temporal relations are represented as  $[TimeRel\ t1\ r\ t2]$
- If all variables are bounded then the temporal database is used directly.
- TIMELOGIC determines set of all possible bindings and this is passed to RHET.
- Once all the variables are bounded then this information is passed to TIMELOGIC which evaluates the consequences of this binding using constraint propagation.