

Test Oracles

- Discussion
 - Automation of oracle necessary
 - Expected behavior given
 - Necessary parts of an oracle
 - Name spaces

Test Oracle

- A test oracle determines whether a system behaves correctly for test execution
- Webster Dictionary - Oracle
 - a person giving wise or authoritative decisions or opinions
 - an authoritative or wise expression or answer

Purpose of Test Oracle

- Sequential Systems
 - Check functionality
- Reactive (event-driven) Systems
 - Check functionality
 - Timing
 - Safety

Reactive Systems

- Complete specification requires use of multiple computational paradigms
- Oracles must judge all behavioral aspects in comparison with all system specifications and requirements
- Hence oracles may be developed directly from formal specifications

Parts of an Oracle

- Oracle information
 - Specifies what constitutes correct behavior
 - Examples: input/output pairs, embedded assertions
- Oracle procedure
 - Verifies the test execution results with respect to the oracle information
 - Examples: equality
- Test monitor
 - Captures the execution information from the run-time environment
 - Examples
 - Simple systems: directly from output
 - Reactive systems: events, timing information, stimuli, and responses

Approach

- Test class
 - Set of test data described by a condition that constrains input data and the initial system state
- Every test class will have an explicitly represented test oracle
- Results are monitored and verified against the oracle corresponding to all test classes satisfied for the test data

Phases of the Approach

- Oracle derivation
 - From specifications for each test class
- Monitoring test execution
- Mapping and applying the oracle procedure to the execution results

