



SOFTWARE TESTING CHALLENGES

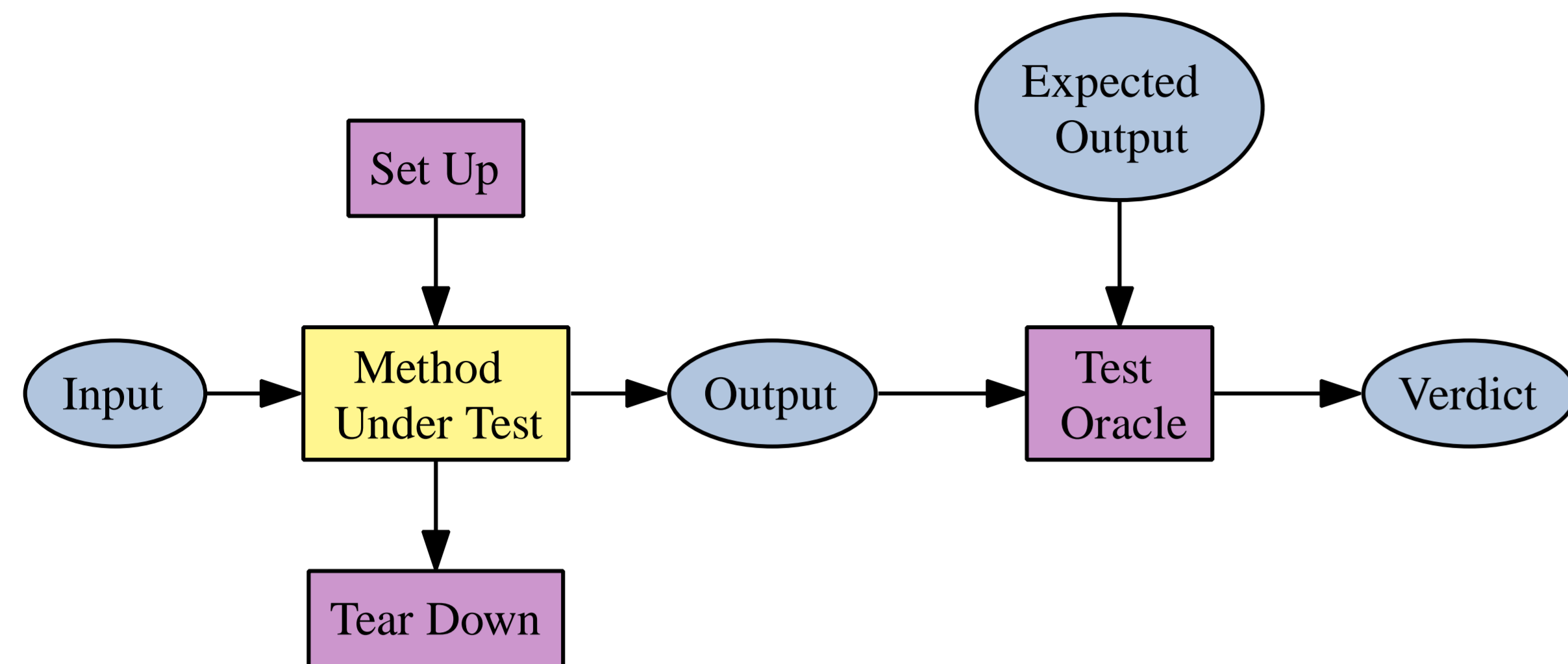


Figure 1: The Procedure for Executing a Test Case

- Complex source code, databases, files, and network communication
- Defects may exist in the individual components or their interactions
- Testing isolates defects and establishes confidence in correctness

REGRESSION TESTING PROCESS

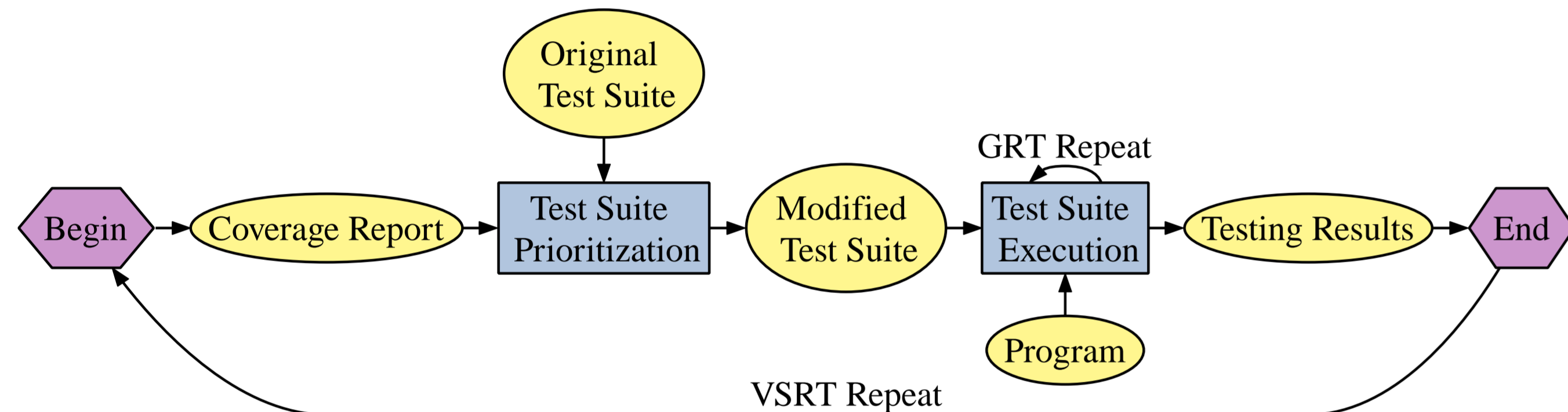


Figure 2: Repeatedly Running a Test Suite During Regression Testing

- When software is **modified**, new tests run in addition to the old, thus **reducing** the risk of a regression in correctness while **increasing** the test suite size
- Coverage reports** identify points in the source code and execution environment (e.g., files and databases) that are **covered** by each test case

TEST COVERAGE MONITORING CHALLENGES

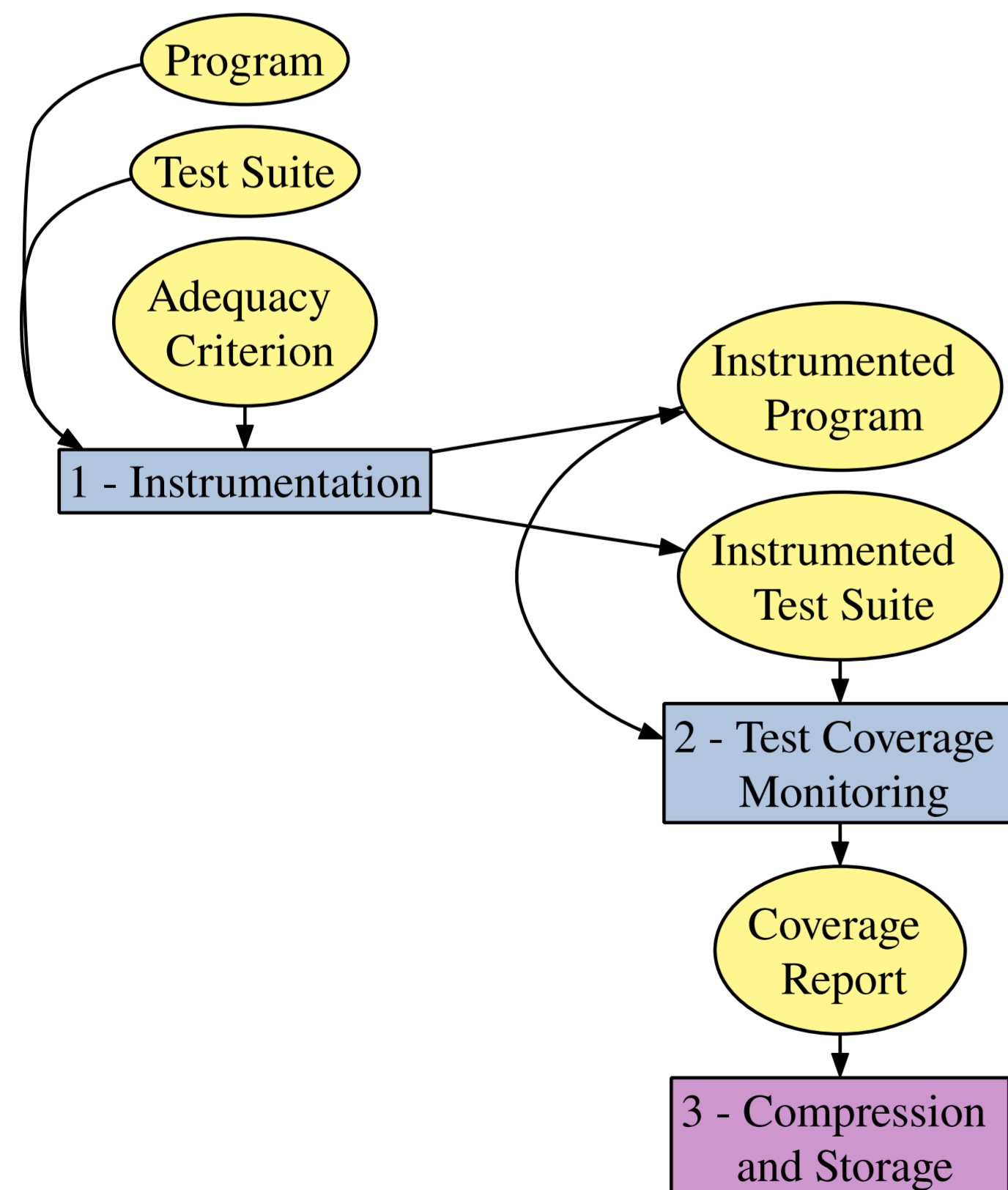
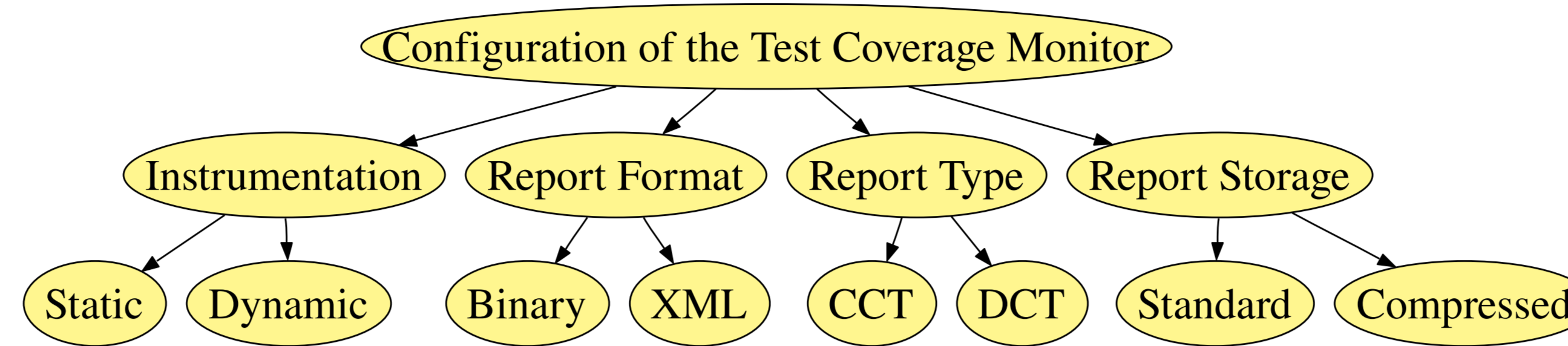


Figure 3: Collecting, Compressing, and Storing the Coverage Reports

- Many **testing** and **analysis** techniques (e.g., fault localizers, adequacy calculators, test prioritizers, debuggers) **require** a test coverage report
- Coverage reports **balloon** in size as the monitor includes many **details** about control flow, data definition and use, and environment interactions

EXPERIMENT GOALS AND DESIGN



Compressors: Gzip, Zip, XMill, and XMLPPM

Figure 4: Configurations of the Test Coverage Monitor

Name	Classes	Methods	NCSS	Per
Reminder (RM)	9	55.0	548.0	Program
		6.11	60.89	Class
			9.96	Method
FindFile (FF)	5	49.0	558.0	Program
		9.8	111.6	Class
			11.39	Method
Pithy (PI)	11	73.0	579.0	Program
		6.64	52.64	Class
			7.93	Method
StudentTracker (ST)	9	72.0	620.0	Program
		8.0	68.89	Class
			8.61	Method
TransactionManager (TM)	6	87.0	748.0	Program
		14.5	124.67	Class
			8.6	Method
GradeBook (GB)	10	147.0	1455.0	Program
		14.7	145.5	Class
			9.9	Method

Figure 5: Case Study Applications

TIME OVERHEAD TO STORE THE COVERAGE REPORTS

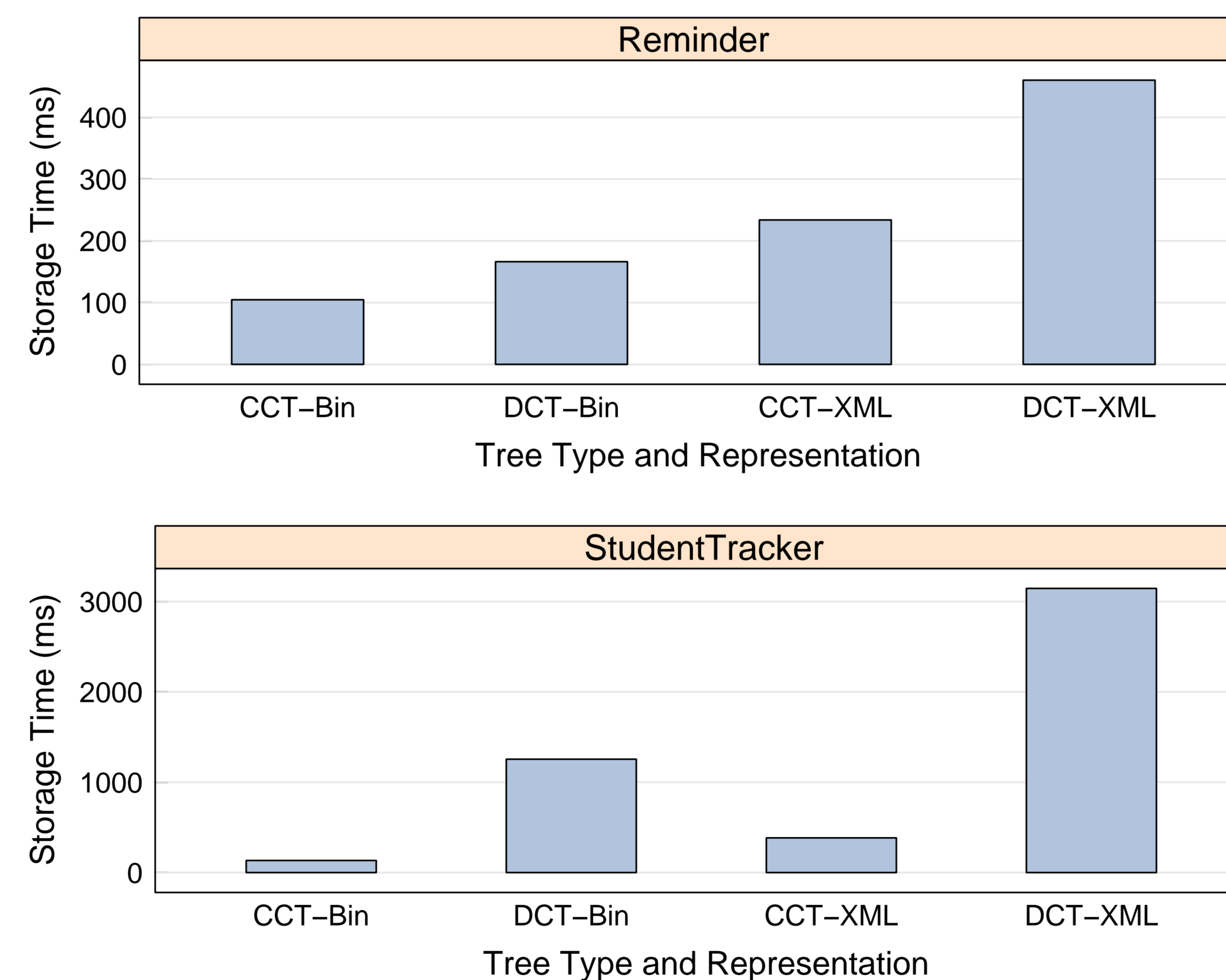


Figure 6: Time to Store the Coverage Reports

Report	Format	Time (ms)
CCT	Binary	144.9
DCT	Binary	1011.72
CCT	XML	408.17
DCT	XML	2569.22

Figure 7: Summary of the Report Storage Times Across All Applications

SIZE OF THE COMPRESSED COVERAGE REPORTS

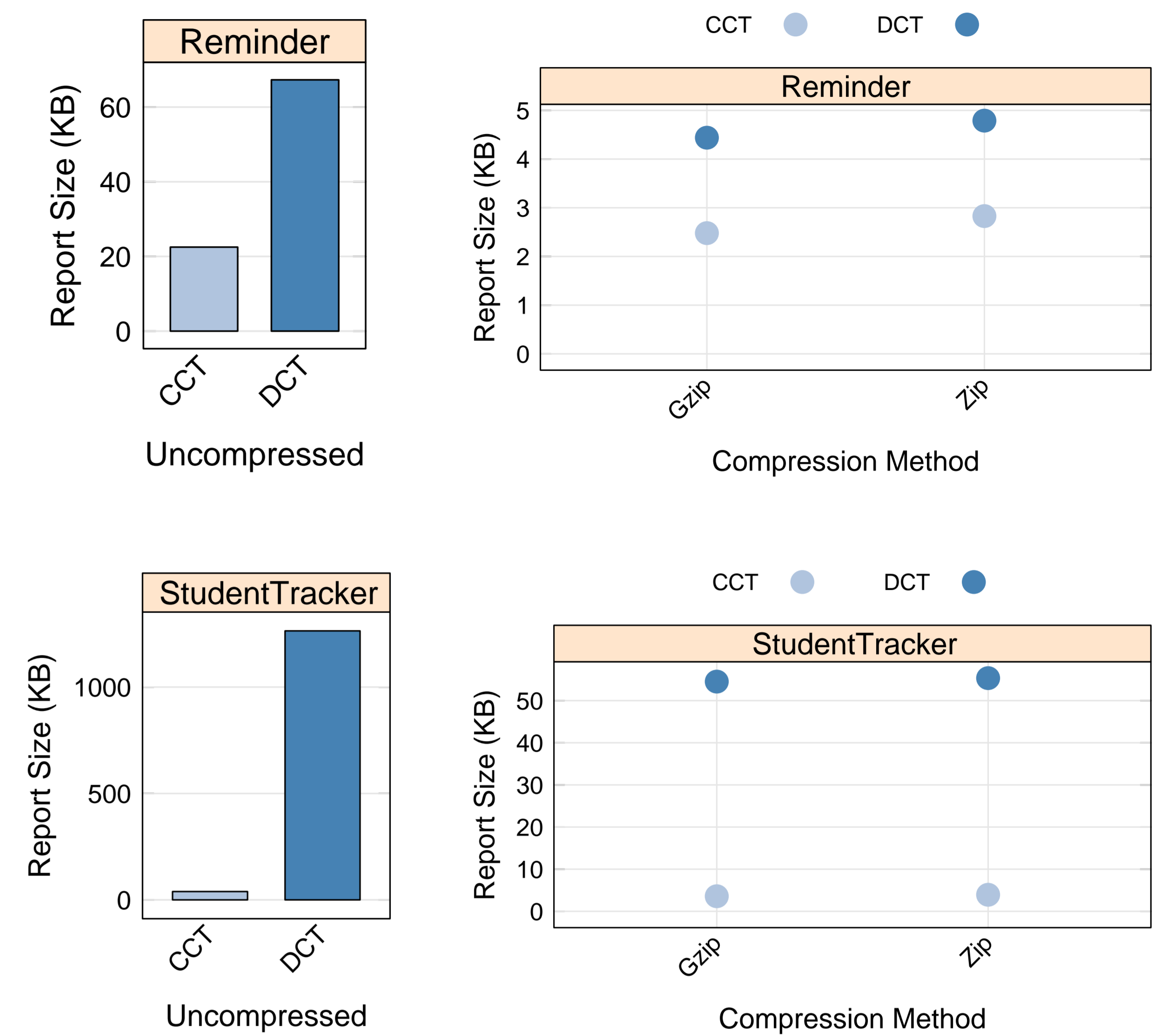


Figure 8: Compressing the Coverage Reports in the Binary Format

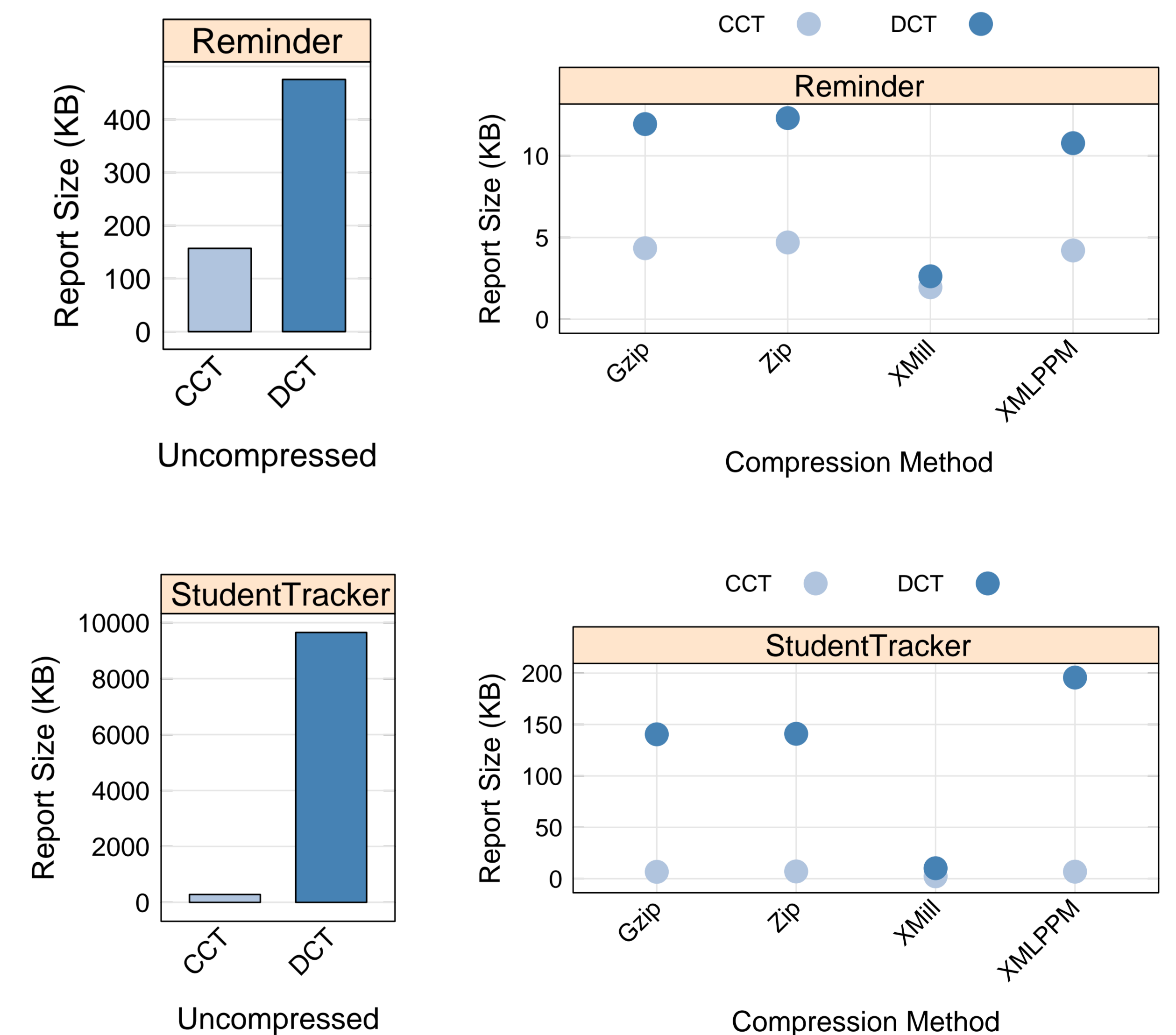


Figure 9: Compressing the Coverage Reports in the XML Format

Format	Original Size (KB)	Compressor	Size (KB)
Binary		Gzip	3.59
Binary		Zip	3.94
XML		Gzip	6.73
XML		Zip	7.09
XML		XMill	2.36
Binary	39.1		
XML	283		

Figure 10: Summary of the Compressed Report Sizes Across All Applications