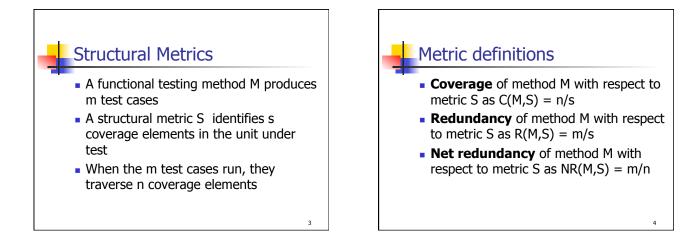


## Measuring Gaps and Redundancy

- We have seen that functional testing methods may produce test suites with serious gaps and a lot of redundancy
- Structural testing analysis allows to measure the extent of these problems



-	Metric values for Triangle									
•	Method	m	n	S	C(M,S)	R(M,S)	NR(M,S)			
	Boundary Value	15	7	11	0.64	1.36	2.14			
	Worst Case Analysis	125	11	11	1.00	11.36	11.36			
	WN ECT	4	4	11	0.36	0.36	1.00			
	Decision Table	8	8	11	0.72	0.72	1.00			

1etric v	alu	les	fc	or Cor	nmis	sion
Method	m	n	s	C(M,S)	R(M,S)	
Output BVA	25	11	11	1	2.27	
Decision table	3	11	11	1	0.27	
DD-path	25	11	11	1	2.27	
DU-path	25	33	33	1	0.76	
Slice	25	40	40	1	0.63	

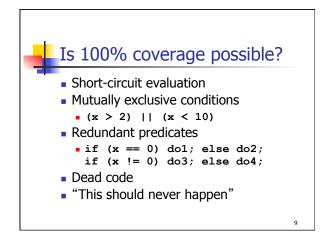


- point out inadequate test suites
- suggest the presence of surprises, such as blind spots in the test design
- Help identify parts of the implementation that require structural testing

Coverage example

- TEX and AWK are widely used programs with comprehensive test suites
- Coverage analysis showed

System	Segment	Branch	P-use	C-use
TEX	85	72	53	48
AWK	70	59	48	55



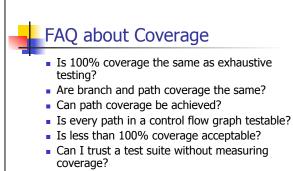
## How to measure coverage?

- The source code is instrumented
- Depending on the code coverage model, code that writes to a trace file is inserted in every branch, statement etc.

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 Most commercial tools measure segment and branch coverage



When can I stop testing?

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## Some answers...

- When you run out of time
- When continued testing reveals no new faults
- When you cannot think of any new test cases
- When you reach a point of diminishing returns
- When mandated coverage has been attained
- When all faults have been removed

