CS409
Software Testing

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Slides adapted from Introduction to Software Testing, Edition 2 (Ch 8)

Administrative Info

- MP2 due November 13, 23:59pm (Late submission will get zero score)
- There are two parts of MP2:
  - Two invitation links:
    - IDM for Joda Time
    - IDM for your selected app
    - Q: Where should we write the answers?
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  Q: Should we commit the code for the selected app?
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Logic lab

- Logic-lab in GitHub Classroom:

https://classroom.github.com/a/6i6xSkX7

Step I: Determine Logic Expression

```
public static void checkIt (boolean a, boolean b, boolean c)
{
   if (a || (b && c))
   {
      System.out.println ("P is true");
   }
   else
   {
      System.out.println ("P isn't true");
   }
}
```

Step 2: Get Predicate Coverage

p = a || (b && c)

1. Make p=true
2. Make p=false

Step 2: Predicate Coverage

p = a || (b && c)

Make p=true

- a=true
- b=true / c = true

Make p=false

- a=false
- b=false/ c=false

Step 3: Get Clause Coverage

p = a || (b && c)

Make each clause true & false

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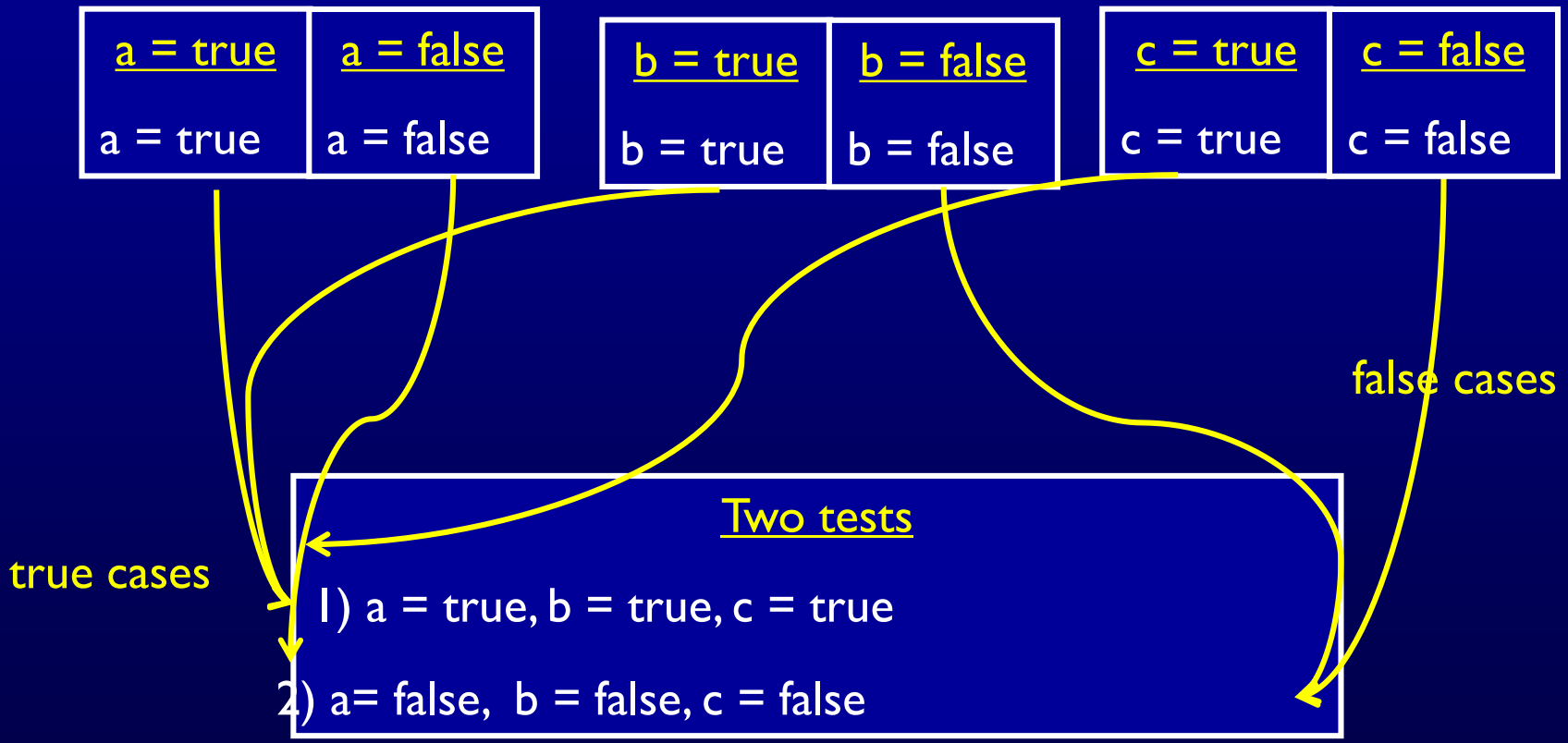

Step 4: Get Combinatorial Coverage

p = a || (b && c)

Combinatorial Coverage (CoC) : For each p in P, TR has test requirements for the clauses in Cp to evaluate to each possible combination of truth values.

How many clauses? 3

How many tests is need? 2^3

work …

Step 4: Get Combinatorial Coverage

p = a || (b && c)

	a	b	c	a || (b && c)
1	T	T	T	T
2	T	T	F	T
3	T	F	T	T
4	T	F	F	T
5	F	T	T	T
6	F	T	F	F
7	F	F	T	F
8	F	F	F	F

Step 5: Get Correlated Active Clause Coverage

p = a || (b && c)

Consider a as active clause

Correlated Active Clause Coverage (CACC) : TR has two requirements for each c_i : c_i evaluates to true and c_i evaluates to false. The values chosen for the minor clauses c_j must cause p to be true for one value of the major clause c_i and false for the other, that is, it is required that $p(c_i = true) != p(c_i = false)$.

work …

Step 6: Get Restricted Active Clause Coverage

p = a || (b && c)

Consider a as active clause

Restricted Active Clause Coverage (RACC) :TR has two requirements for each c_i: c_i evaluates to true and c_i evaluates to false. The values chosen for the minor clauses c_j must be the same when c_i is true as when c_i is false, that is, it is required that $c_j(c_i = true) = c_j(c_i = false)$ for all c_j.

work …

CACC and RACC

	a	b	c	a && (b || c)
1	T	T	T	T
2	T	T	F	T
3	T	F	T	T
4	T	F	F	F
5	F	T	T	F
6	F	T	F	F
7	F	F	T	F
8	F	F	F	F

	a	b	c	a && (b || c)
1	T	T	T	T
2	T	T	F	T
3	T	F	T	T
4	T	F	F	F
5	F	T	T	F
6	F	T	F	F
7	F	F	T	F
8	F	F	F	F

major clause

P_a : b=true or c = true

CACC can be satisfied by choosing any of rows 1, 2, 3 AND any of rows 5, 6, 7 – a total of nine pairs

RACC can only be satisfied by row pairs (1, 5), (2, 6), or (3, 7)

Only three pairs

Step 7: Find p_c that determine p

p = a || (b && c)

Consider a as active clause

$p_a = p_{a=true} \oplus p_{a=false}$

work …

Step 7: Find p_c that determine p

$$p = a \,||\, (b \,\&\&\, c)$$

$P_a = P_{a=true} \oplus P_{a=false}$

$= (true \,||\, (b \,\&\&\, c)) \oplus (false \,||\, (b \,\&\&\, c))$

$= true \oplus (b \,\&\&\, c)$

$= \neg\, (b \,\&\&\, c)$

$= \neg\, b \,||\, \neg\, c$

Step 8: Tried it on Tool

- Tried to use the logic coverage tool at:
- https://cs.gmu.edu:8443/offutt/coverage/LogicCoverage

Step 9: Write test

- Write JUnit test for achieving:
  - Predicate Coverage
  - Clause Coverage
  - CACC
  - RACC

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    - **Start early!**