

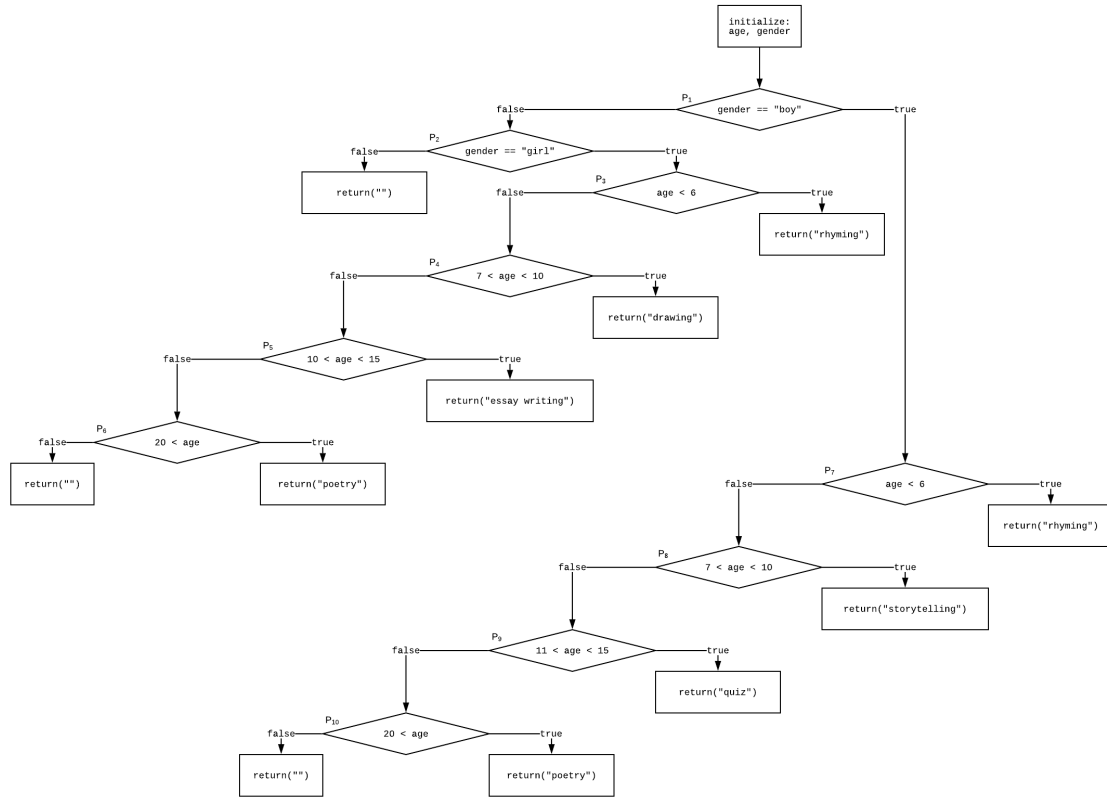
Domain Testing

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1 ticketing_module.py

```
1 __author__ = "Zelin Cai, Patrick Silvestre"
2 __license__ = "MIT"
3
4
5 def ticketing_module(age, gender):
6     if gender == "boy":
7         if age < 6:
8             return "rhyming"
9         elif 7 < age < 10:
10            return "storytelling"
11        elif 11 < age < 15:
12            return "quiz"
13        elif 20 < age:
14            return "poetry"
15        else:
16            return ""
17    elif gender == "girl":
18        if age < 6:
19            return "rhyming"
20        elif 7 < age < 10:
21            return "drawing"
22        elif 10 < age < 15:
23            return "essay writing"
24        elif 20 < age:
25            return "poetry"
26        else:
27            return ""
28    else:
29        return ""
```

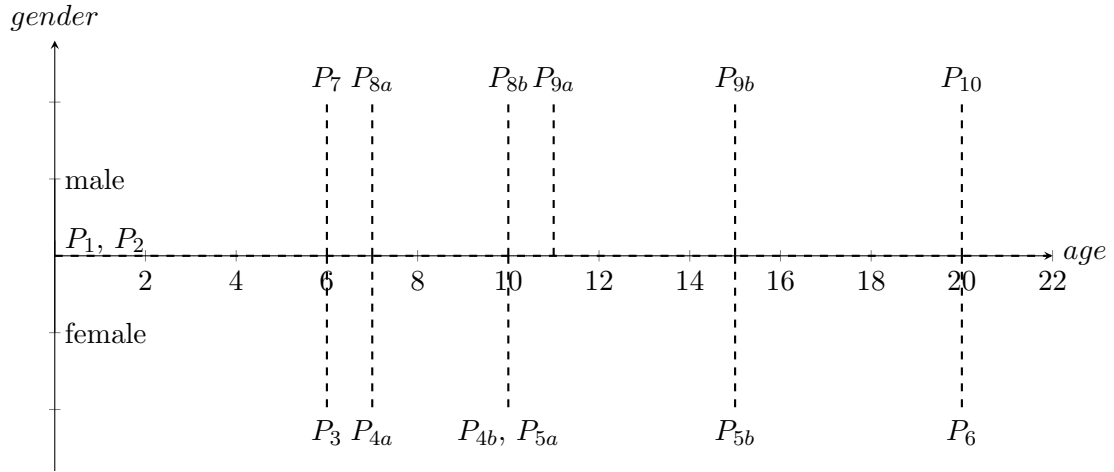
2 Control Flow Graph



3 Predicates

| # | Predicate |
|----------|------------------|
| P_1 | gender == "boy" |
| P_2 | gender == "girl" |
| P_3 | age < 6 |
| P_{4a} | 7 < age |
| P_{4b} | age < 10 |
| P_{5a} | 10 < age |
| P_{5b} | age < 15 |
| P_6 | 20 < age |
| P_7 | age < 6 |
| P_{8a} | 7 < age |
| P_{8b} | age < 10 |
| P_{9a} | 11 < age |
| P_{9b} | age < 15 |
| P_{10} | 20 < age |

4 Domain Graph



5 Test Cases

Order of tests is ON (on the border), ON, OFF.

5.1 Predicate P_1 gender == “boy”

5.1.1 Boundary Shift - Reduced Domain

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “boy” | Yes |
| “girl” | “girl” | “boy” | Yes |
| “boy” | “boy” | “boy” | No |

5.1.2 Boundary Shift - Increased Domain

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “girl” | Yes |
| “girl” | “girl” | “girl” | No |
| “boy” | “boy” | “girl” | Yes |

5.1.3 Boundary Tilt

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “girl” | Yes |
| “girl” | “girl” | “boy” | Yes |
| “boy” | “boy” | “boy” | No |

5.1.4 Closure Error

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “boy” | “ ” | Yes |
| “boy” | “boy” | “boy” | No |
| “girl” | “girl” | “girl” | No |

5.2 Predicate P_2 gender == “girl”

5.2.1 Boundary Shift - Reduced Domain

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “girl” | Yes |
| “boy” | “boy” | “girl” | Yes |
| “girl” | “girl” | “girl” | No |

5.2.2 Boundary Shift - Increased Domain

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “boy” | No |
| “boy” | “boy” | “boy” | No |
| “girl” | “girl” | “boy” | Yes |

5.2.3 Boundary Tilt

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “ ” | “girl” | Yes |
| “boy” | “boy” | “boy” | No |
| “girl” | “girl” | “girl” | No |

5.2.4 Closure Error

| Test | Actual Input | Expected Input | Fault Detected |
|--------|--------------|----------------|----------------|
| “ ” | “girl” | “ ” | Yes |
| “girl” | “girl” | “girl” | No |
| “boy” | “boy” | “boy” | No |

5.3 Predicate P_3 age < 6

5.3.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “rhyming” | Yes |
| 6.0001 | “ ” | “rhyming” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |

5.3.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “ ” | No |
| 6.0001 | “ ” | “ ” | No |
| 5.9999 | “rhyming” | “ ” | Yes |

5.3.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “ ” | No |
| 6.0001 | “ ” | “rhyming” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |

5.3.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “rhyming” | “ ” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |
| 6.0001 | “ ” | “ ” | No |

5.4 Predicate P_{4a} $7 < \text{age}$

5.4.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 7 | “ ” | “drawing” | Yes |
| 6.9999 | “ ” | “drawing” | Yes |
| 7.0001 | “drawing” | “drawing” | No |

5.4.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 7 | “ ” | “ ” | No |
| 6.9999 | “ ” | “ ” | No |
| 7.0001 | “drawing” | “ ” | Yes |

5.4.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 7 | “ ” | “drawing” | Yes |
| 6.9999 | “ ” | “ ” | No |
| 7.0001 | “drawing” | “drawing” | No |

5.4.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 7 | “drawing” | “ ” | Yes |
| 7.0001 | “drawing” | “drawing” | No |
| 6.9999 | “ ” | “ ” | No |

5.5 Predicate P_{4b} age < 6

5.5.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “drawing” | Yes |
| 10.0001 | “essay writing” | “drawing” | Yes |
| 9.9999 | “drawing” | “drawing” | No |

5.5.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “essay writing” | Yes |
| 10.0001 | “essay writing” | “essay writing” | No |
| 9.9999 | “drawing” | “essay writing” | Yes |

5.5.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “essay writing” | Yes |
| 10.0001 | “essay writing” | “drawing” | Yes |
| 9.9999 | “drawing” | “drawing” | No |

5.5.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “drawing” | “ ” | Yes |
| 9.9999 | “drawing” | “drawing” | No |
| 10.0001 | “essay writing” | “essay writing” | No |

5.6 Predicate P_{5a} $10 < \text{age}$

5.6.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “essay writing” | Yes |
| 9.9999 | “drawing” | “essay writing” | Yes |
| 10.0001 | “essay writing” | “essay writing” | No |

5.6.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “drawing” | Yes |
| 9.9999 | “drawing” | “drawing” | No |
| 10.0001 | “essay writing” | “drawing” | Yes |

5.6.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “ ” | “essay writing” | Yes |
| 9.9999 | “drawing” | “drawing” | No |
| 10.0001 | “essay writing” | “essay writing” | No |

5.6.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 10 | “essay writing” | “ ” | Yes |
| 10.0001 | “essay writing” | “essay writing” | No |
| 9.9999 | “drawing” | “drawing” | No |

5.7 Predicate P_{5b} age <15

5.7.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 15 | “ ” | “essay writing” | Yes |
| 15.0001 | “ ” | “essay writing” | Yes |
| 14.9999 | “essay writing” | “essay writing” | No |

5.7.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 15 | “ ” | “ ” | No |
| 15.0001 | “ ” | “ ” | No |
| 14.9999 | “essay writing” | “ ” | Yes |

5.7.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 15 | “ ” | “ ” | No |
| 15.0001 | “ ” | “essay writing” | Yes |
| 14.9999 | “essay writing” | “essay writing” | No |

5.7.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|-----------------|-----------------|----------------|
| 15 | “essay writing” | “ ” | Yes |
| 14.9999 | “essay writing” | “essay writing” | No |
| 15.0001 | “ ” | “ ” | No |

5.8 Predicate P_6 $20 < \text{age}$

5.8.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “poetry” | Yes |
| 19.9999 | “ ” | “poetry” | Yes |
| 20.0001 | “poetry” | “poetry” | No |

5.8.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “ ” | No |
| 19.9999 | “ ” | “ ” | No |
| 20.0001 | “poetry” | “ ” | Yes |

5.8.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “poetry” | Yes |
| 19.9999 | “ ” | “ ” | No |
| 20.0001 | “poetry” | “poetry” | No |

5.8.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “poetry” | “ ” | Yes |
| 20.0001 | “poetry” | “poetry” | No |
| 19.9999 | “ ” | “ ” | No |

5.9 Predicate P_7 age < 6

5.9.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “rhyming” | Yes |
| 6.0001 | “ ” | “rhyming” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |

5.9.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “ ” | No |
| 6.0001 | “ ” | “ ” | No |
| 5.9999 | “rhyming” | “ ” | Yes |

5.9.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “ ” | “ ” | No |
| 6.0001 | “ ” | “rhyming” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |

5.9.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|--------|---------------|-----------------|----------------|
| 6 | “rhyming” | “ ” | Yes |
| 5.9999 | “rhyming” | “rhyming” | No |
| 6.0001 | “ ” | “ ” | No |

5.10 Predicate P_{8a} $7 < \text{age}$

5.10.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|----------------|-----------------|----------------|
| 7 | “ ” | “storytelling” | Yes |
| 6.9999 | “ ” | “storytelling” | Yes |
| 7.0001 | “storytelling” | “storytelling” | No |

5.10.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|--------|----------------|-----------------|----------------|
| 7 | “ ” | “ ” | No |
| 6.9999 | “ ” | “ ” | No |
| 7.0001 | “storytelling” | “ ” | Yes |

5.10.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|--------|----------------|-----------------|----------------|
| 7 | “ ” | “storytelling” | Yes |
| 6.9999 | “ ” | “ ” | No |
| 7.0001 | “storytelling” | “storytelling” | No |

5.10.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|--------|----------------|-----------------|----------------|
| 7 | “storytelling” | “ ” | Yes |
| 7.0001 | “storytelling” | “storytelling” | No |
| 6.9999 | “ ” | “ ” | No |

5.11 Predicate P_{sb} age < 10

5.11.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|----------------|-----------------|----------------|
| 10 | “ ” | “storytelling” | Yes |
| 10.0001 | “ ” | “storytelling” | Yes |
| 9.9999 | “storytelling” | “storytelling” | No |

5.11.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|----------------|-----------------|----------------|
| 10 | “ ” | “ ” | No |
| 10.0001 | “ ” | “ ” | No |
| 9.9999 | “storytelling” | “ ” | Yes |

5.11.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|----------------|-----------------|----------------|
| 10 | “ ” | “ ” | No |
| 10.0001 | “ ” | “storytelling” | Yes |
| 9.9999 | “storytelling” | “storytelling” | No |

5.11.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|----------------|-----------------|----------------|
| 10 | “storytelling” | “ ” | Yes |
| 9.9999 | “storytelling” | “storytelling” | No |
| 10.0001 | “ ” | “ ” | No |

5.12 Predicate P_{9a} $11 < \text{age}$

5.12.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 11 | “ ” | “quiz” | Yes |
| 10.9999 | “ ” | “quiz” | Yes |
| 11.0001 | “quiz” | “quiz” | No |

5.12.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 11 | “ ” | “ ” | No |
| 10.9999 | “ ” | “ ” | No |
| 11.0001 | “quiz” | “ ” | Yes |

5.12.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 11 | “ ” | “quiz” | Yes |
| 10.9999 | “ ” | “ ” | No |
| 11.0001 | “quiz” | “quiz” | No |

5.12.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 11 | “quiz” | “ ” | Yes |
| 11.0001 | “quiz” | “quiz” | No |
| 10.9999 | “ ” | “ ” | No |

5.13 Predicate P_{9b} age <15

5.13.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 15 | “ ” | “quiz” | Yes |
| 15.0001 | “ ” | “quiz” | Yes |
| 14.9999 | “quiz” | “quiz” | No |

5.13.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 15 | “ ” | “ ” | No |
| 15.0001 | “ ” | “ ” | No |
| 14.9999 | “quiz” | “ ” | Yes |

5.13.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 15 | “ ” | “ ” | No |
| 15.0001 | “ ” | “quiz” | Yes |
| 14.9999 | “quiz” | “quiz” | No |

5.13.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 15 | “quiz” | “ ” | Yes |
| 14.9999 | “quiz” | “quiz” | No |
| 15.0001 | “ ” | “ ” | No |

5.14 Predicate P_{10} $20 < \text{age}$

5.14.1 Boundary Shift - Reduced Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “poetry” | Yes |
| 19.9999 | “ ” | “poetry” | Yes |
| 20.0001 | “poetry” | “poetry” | No |

5.14.2 Boundary Shift - Increased Domain

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “ ” | No |
| 19.9999 | “ ” | “ ” | No |
| 20.0001 | “poetry” | “ ” | Yes |

5.14.3 Boundary Tilt

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “ ” | “poetry” | Yes |
| 19.9999 | “ ” | “ ” | No |
| 20.0001 | “poetry” | “poetry” | No |

5.14.4 Closure Error

| Test | Actual Output | Expected Output | Fault Detected |
|---------|---------------|-----------------|----------------|
| 20 | “poetry” | “ ” | Yes |
| 20.0001 | “poetry” | “poetry” | No |
| 19.9999 | “ ” | “ ” | No |