



## Negative Testing

- Testing that, which is not in the specification?
- Testing with invalid input?
- Testing with the sole intent of breaking the system?
  
- **Which techniques exist here?**



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## Negative Testing

### Equivalence Partitioning

- On one hand, functional specification-based technique
- On the other hand, enforces the consideration of the **entire** input space

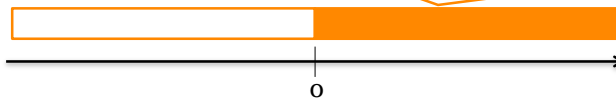


## Negative Testing

### Equivalence Partitioning

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**Simple example:** If we define a partition, where the valid input are above zero...

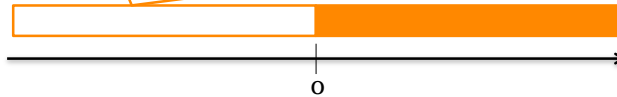




## Negative Testing Equivalence Partitioning

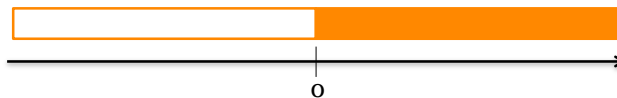
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...we will also have to consider the case with a zero or below input



## Negative Testing Equivalence Partitioning

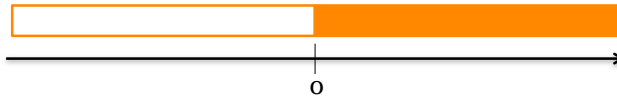
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- The key aspect is partition **completeness**





## Negative Testing Equivalence Partitioning

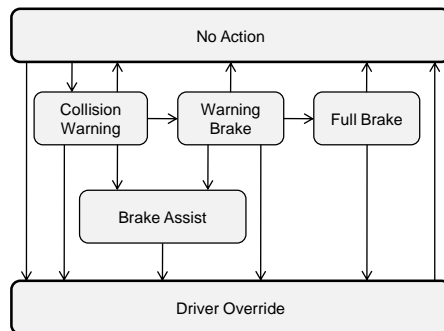
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- The key aspect is partition **completeness**



- **One problem:** What if a "desired" input parameter is missing altogether?



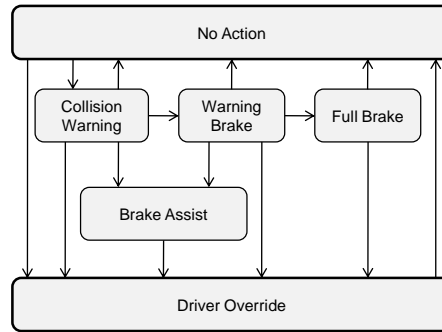
## Negative Testing Model-Based Testing



- Helps visualize what is assumed to be valid/invalid input for each state.
- What happens if an unspecified input is given in a specific state?
- Helps visualize what is potentially missing in the specification.
- Negative situations are not enforced as in equivalence partitioning.



## Negative Testing Model-Based Testing



Can you identify any problems here?

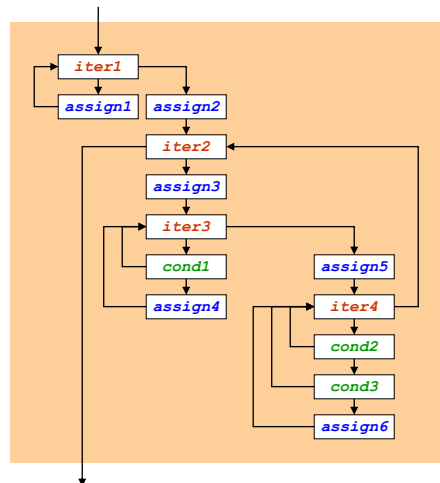
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## Negative Testing Structural Techniques

### Discussion

How do structural techniques relate to negative testing?

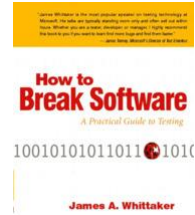






## Whittaker's Attacks

- James A. Whittaker
  - Professor at Florida Institute of Technology
- Defined a number of "attacks", e.g.,
  - *Force a data structure to store too many or too few values*
  - *Vary or corrupt file contents*
  - *Inject network faults*



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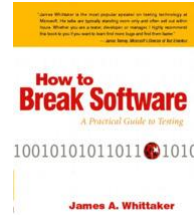
Many of these attacks were shown to break Microsoft software...

...hence, James was later employed by Microsoft ☺ (and then Google, and then Microsoft again)



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- Defined a number of "attacks", e.g.,
  - *Force a data structure to store too many or too few values*
  - *Vary or corrupt file contents*
  - *Inject network faults*
- The attacks are quite desktop-software-specific



## Magic Values

- Inputs that are historically known to cause problems
  - Zero
  - Special characters
  - Null pointers
  - More suggestions?