Availability and Continuity for Time Critical Services

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Availability: Traditional Definition

- Availability = P(System being up) = \frac{\text{Up Time}}{\text{Total Time}}

- Problems:
  A. 
  B. 
  C. 

- All of the above are 90% availability
- No distinction for large downtime or small uptime
- Revised Definition: Ignore small uptime
- Availability2 = P(System being up > Ta) = \sum \frac{(\text{Uptime}|\text{Uptime} > Ta)}{\text{Total Time}}
Continuity: Definition 1

- Continuity = \( P(\text{Transaction completion}) \)
  
  Transaction Time = \( T_c \)

  = \( P(\text{Uptime} > T_c) = \sum (\text{Uptime}|\text{Uptime} > T_c) \)

  Total Time

- This is the current definition of continuity.

- This is same as Availability2 with \( T_a \) replaced by \( T_c \).

- Problems:
  - Ignores large downtimes
  - It is really not the probability of transaction completion
Continuity: Definition 2

- Uptime: ----------------- ---- -----
- 3Slot Trans Success: ----- -- ------

\[ P(\text{Transaction Completion}) = \sum ((\text{Uptime}-(Tc-1))|\text{Uptime}>Tc)) \]

Problem: Still does not account for large downtimes
Assumes risk is proportional to total downtime

![Graphs showing risk vs. downtime for continuous and time critical systems.]
Percentiles

- 99.9-percentile downtime and 0.1-percentile uptime are more meaningful than any metric based on total uptime or downtime
- Alternately:
  - Probability of downtime > $T_c = 0.999$
  - Probability of Uptime < $T_a = 0.001$
For time critical services, sums are meaningless (Difficult to assess risk)

Statistics related to individual downtime or uptime are more meaningful

Percentiles of downtime are meaningful in risk assessment.