

The Actor Model as a Load Testing Framework

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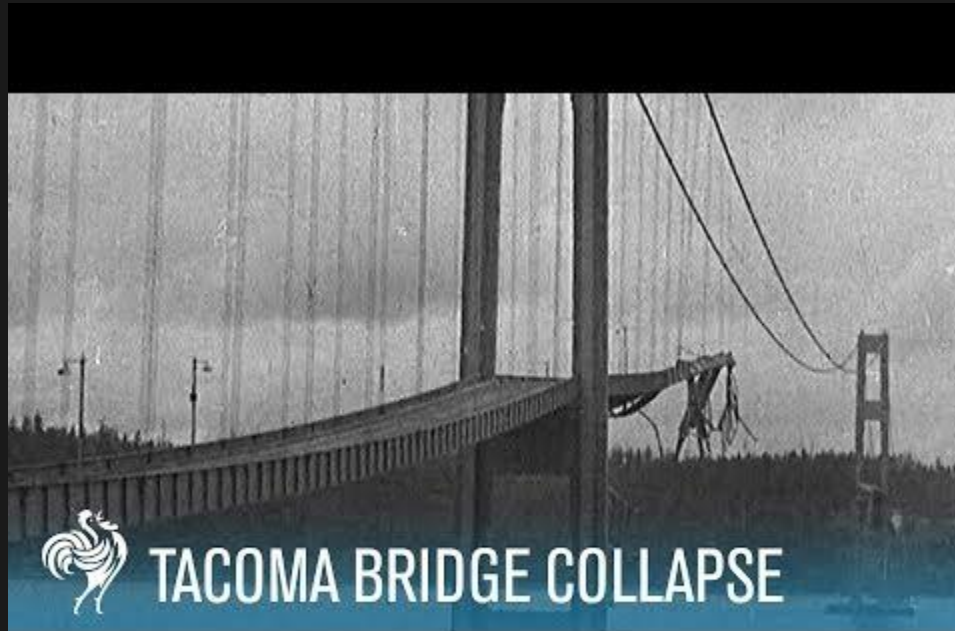
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An analogy

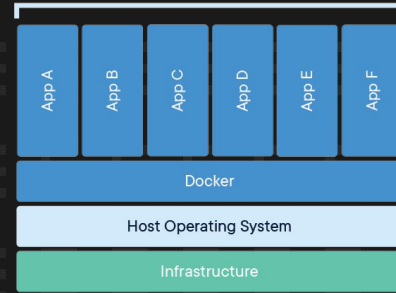
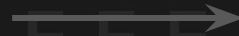
The Tacoma Bridge



The Tacoma Bridge



The (virtual) Tacoma Bridges



The (virtual) Tacoma Bridges

- Interactions?
- Traffic capacity?
- Amplifying factor?
- Old forces that only now start to matter?



Terminology



Framework

- A framework is a generic term commonly referring to an essential supporting structure which other things are built on top of. [\[Wikipedia\]](#)
- A supporting structure around which something can be built [\[Cambridge dictionary\]](#)
- A system of rules, ideas, or beliefs that is used to plan or decide something [\[Cambridge dictionary\]](#)



Framework



A system of rules, ideas, or beliefs that is used to plan or decide something

[\[Cambridge dictionary\]](#)

Model



A system of postulates, data, and inferences presented as a mathematical description of an entity

[\[Merriam-Webster\]](#)

Testing

The process of using or trying something to see if it works, is suitable, obeys the rules, etc.

[\[Cambridge dictionary\]](#)

Load

A mass or quantity of something taken up and carried, conveyed, or transported [\[Thesaurus\]](#)



Load Testing

The process of trying something can carry a mass or quantity of work, and verify how it behaves under varying such quantities

- Performance — at minimum load
- Load — at very high load
- Stress — at failure



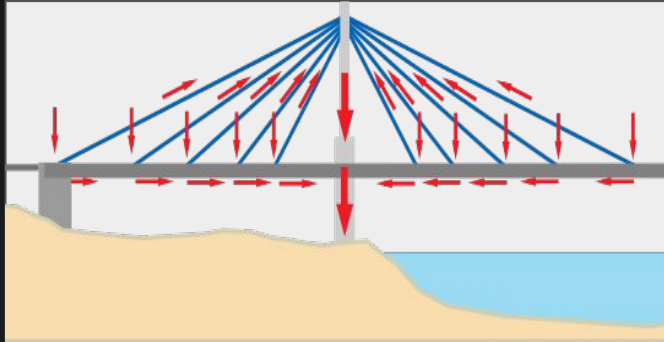
Load Testing Framework

A system of tools and ideas to apply loads in all the possible ways the system *allows*:

- Unit of measurement
- Interactions



The loads



The forces



The users

Actors

An Actor can, in response to a message it receives:

- send a finite number of messages to other Actors
- create a finite number of new Actors
- designate the behavior to be used for the next message it receives



The universal primitive

Everything is a...



An aerial photograph of a forest, showing a dense network of tree roots and branches. The lighting is dramatic, with bright highlights on the roots and deep shadows in the canopy. A crow is perched on a branch in the upper right quadrant.

**Light thickens, and the crow/
Makes wing to the rooky wood.**

Shakespeare, Macbeth, Act 3, Scene 2

A Murder of Crows

- Interactions?
- Traffic capacity?
- Amplifying factor?
- Old new forces?



Forces in play

Say we have a chat system:

- Session establishment
- Send messages
- Fetch your archives
- Join/leave group-chats
- *(And much more stuff)*



Run all the actors

- *init* a scenario, once
 - Metrics, conditions, databases
- *Start* all the actors, every single time
 - Each actor executes its force
- Run the scenario
 - Locally or distributed



Throttle

Set a Rate per Interval for an action

- Progressive rate control
- Actors wait for throttler's approval
- Actors ask other actors to wait for throttler's approval



Coordinate

- Pick a number of users for an action
 - all
 - a list
 - a set of distinct pairs
- Users are given to a callback as they join the coordination plan





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