It's the protocol, …

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Web as Computational Eco-system

- Resources are globally available with vastly more resources available on the periphery than at the core of the network.
- Resources are heterogeneous and controlled by multiple trust domains across organizational boundaries.
- Resources present themselves as services to be discovered and exploited in a loosely coupled manner rather than as bodies of code to be downloaded.
- Extensibility happens without central authority or coordination.
In this world…

• Applications become composition of concurrent services rather than monolithic entities
• Synchronization happens through communication.
• Trend is for software as well as hardware.
The problem is that…

• Current programming models have…
  • Poor support for concurrency and asynchronicity
    – Using threads or hand-coded state machines is just plain hard
    – Add loose coupling and this becomes even harder
  • Testing decentralized/distributed apps is equally hard
    – Programs are debugged by testing them a lot. Such testing is both expensive and incomplete in its elimination of bugs.
• Different models at different layers in the stack
  – Bridging happens though lots of glue code between different models (objects, protocols, C-style APIs…)
• Gap between specification and implementation
  – How to know whether exposed behavior is intended or buggy?
  – How to know the semantics of an interaction?
  – How to know the behavior of a service?
The Task Ahead

• Need a programming model that can harness the computational power of the Web by distributing work over the available massively parallel, asynchronous loosely coupled resources in an integral manner.