Concurrency (computer science) +3

What are the best languages for writing highly concurrent programs?



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Ulf Wiger, Specializing in massively concurrent, distributed, high-availability



Answered Apr 26, 2016

There are different flavors of concurrency, and (unsurprisingly) different languages address these differently. Note that there are middleware and cloud environments that address these areas, esp. for mainstream languages. I will leave them aside and focus on languages that have

- Embarrassingly parallel code. This is where lots of tasks are executed in parallel with no interaction between them and no (or minimal) synchronization required. Here, languages like Erlang and Haskell and Clojure work well, and also make use of multiple cores. From what I can tell, Go also works well here.
- Data parallelism, where you use parallelization to speed up e.g. computation jobs; the concurrent tasks have to synchronize at various points in a problem-specific fashion. Erlang is a bit hit-and-miss here, since it isn't the fastest computation language, and also doesn't thrive on data sharing. Haskell is at the forefront of language and compiler support in this area, and Clojure has some very nice data structures and constructs for shared-memory concurrency. However, in the exotic niche of huge computation clusters, Erlang is attractive due to its native support for distributed processing and fault tolerance. I would imagine that Go suffers a bit similarly to Erlang, in that the robust way to approach the problem channels - is a bit too inefficient. While it lets you use e.g. semaphores for synchronization, so do most mainstream languages; I consider that fairly primitive support.
- Orchestration logic, where the concurrent tasks need to coordinate with each other in a stateful manner, is the domain of Erlang. Cloud Haskell and Akka are modeled after Erlang, and Akka has a considerable commercial user base. Elixir is a Ruby-like language that runs on the Erlang VM and has the same expressive power for concurrency as Erlang. Go has a solid CSPlike concurrency model, but lacks Erlang's error handling support (i.e. builtin logic for recovering from process crashes)

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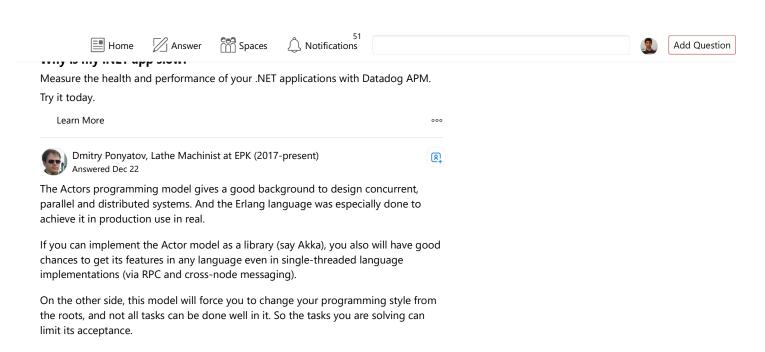
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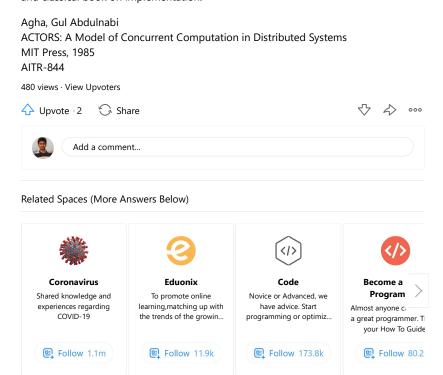
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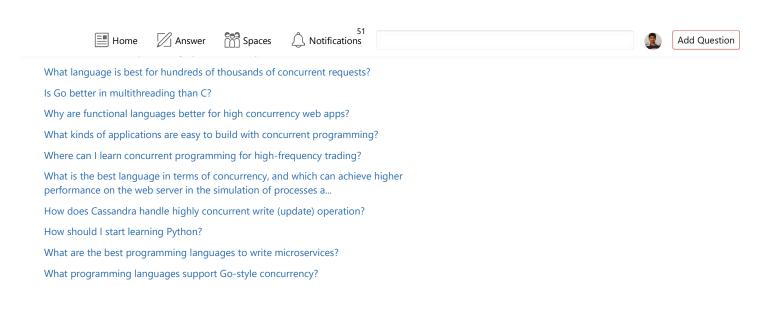


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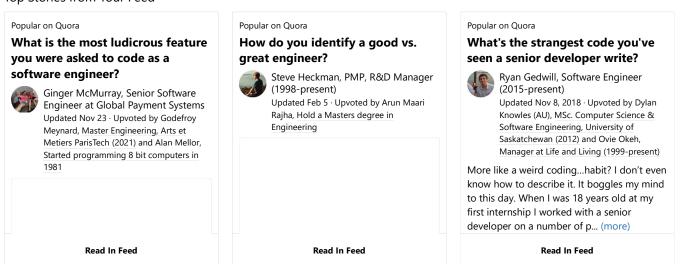
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