What you don't have:
- A prototype at hand attracting users and investors
- A large-scale cloud platform of more than a handful of machines
- Perhaps you only have a single high-end machine at hand
- Neither a lot of money, nor a lot of time

Prototype a Scholarly Search

Assume you are a small (research) team having awesome ideas for an analytic feature for a new scholarly search engine.

**Protobase Architecture**
- Open source analytic NoSQL main-memory document store to prototype micro- webservices
- Instantiated with user-defined code
- Hides itself behind user-defined REST API
  - direct access to storage engine and query engine (i.e., no query language)
    - No inter-process comm. overhead
    - Less data marshaling
    - Less systems involved to get things done
    - Extends engine with custom logic
    - Optimization possible, though
- Philosophy: instance is micro-webservice
- Operates on CARBON files
- Parallelization across components

**CARBON Files**

```
{ ["a", 1], ["b", 2], ["c", 3], ["d", 4], ["e", 5], ["f", 6] }
```

**Microsoft Academic Graph Analytics**

**PAN Queries**

- (1) Displaying publication information given a paper title
- (2) Listing publications within a certain time span given a specific author's name,
- (3) List publications via the cited-by relationship.