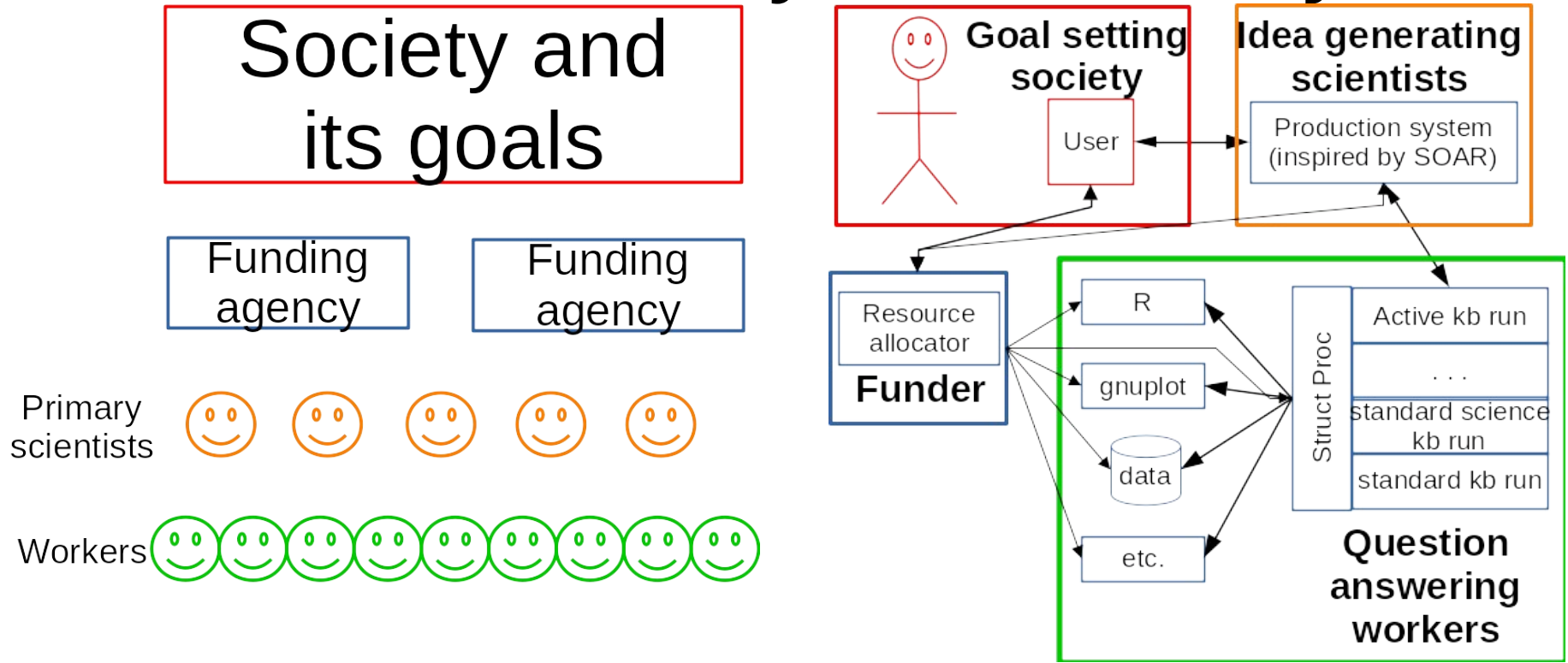


Process Level Architecture of Greater Scienceomatic Environment

Joseph Phillips
2022 October 21
Applied Philosophy of Science

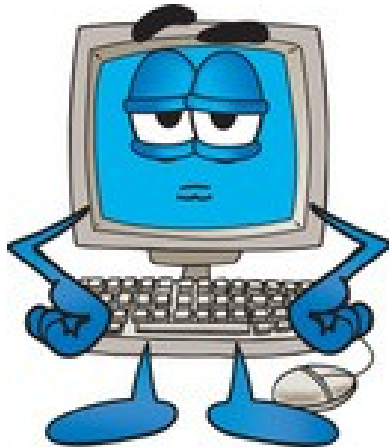
The Essential Analogy Between Science in Society, and our System



3 Modes of Scienceomatic Program

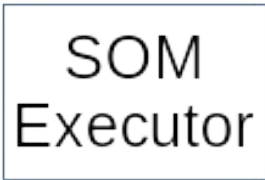
- SINGLE_USER_SERVER_MODE
 - One user, command line interface
- SOM_SERVER_MODE
 - Launches processes needed by full architecture
- HTTP_SERVER_MODE
 - Launches processes needed by full architecture
 - Implements HTTP server too

Consider One Scienceomatic Server On One Computer



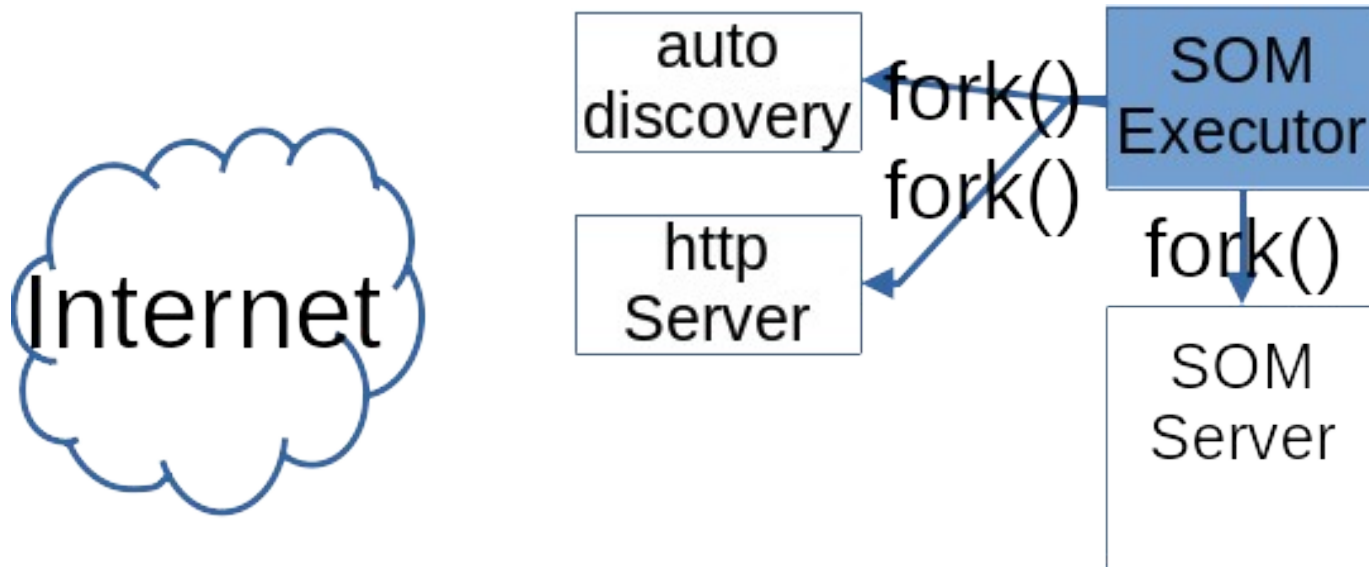
HTTP Server Initialization:

- Step 0: Start in HTTP server mode:
 - \$ `./somExec path=.. --serverMode=http`



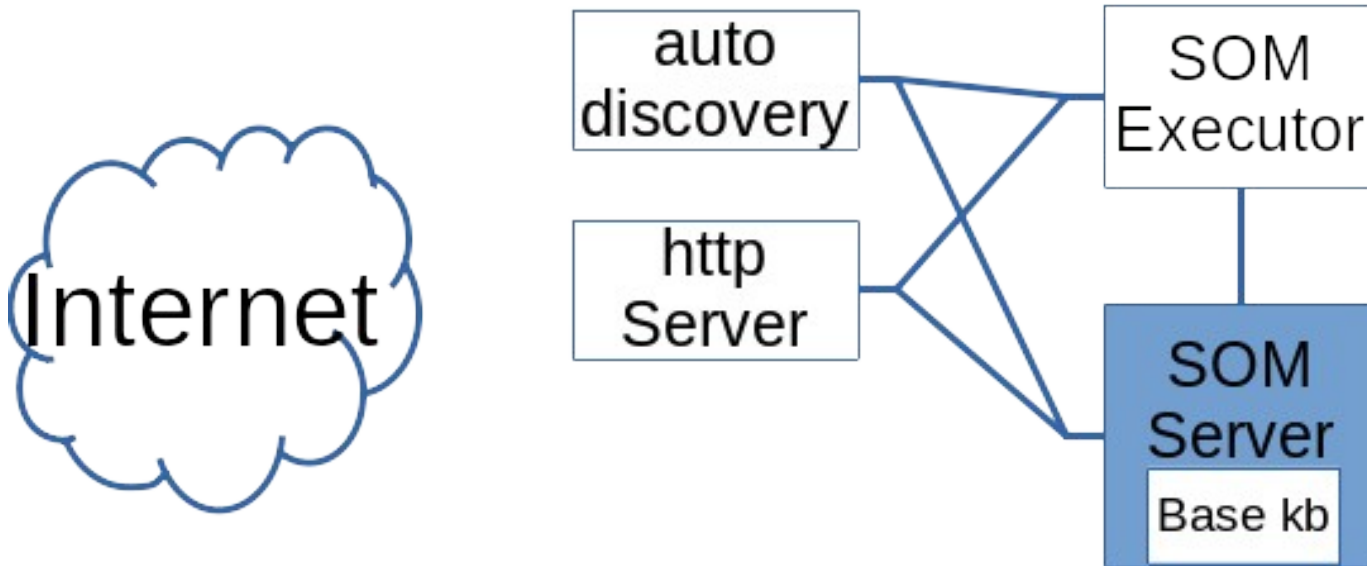
HTTP Server Initialization:

- Step 1: `fork()`s server and http processes
 - Auto discovery uses AI to do scientific discovery itself
 - HTTP server handles all incoming HTTP traffic
 - SOM server manages SOM clients



HTTP Server Initialization:

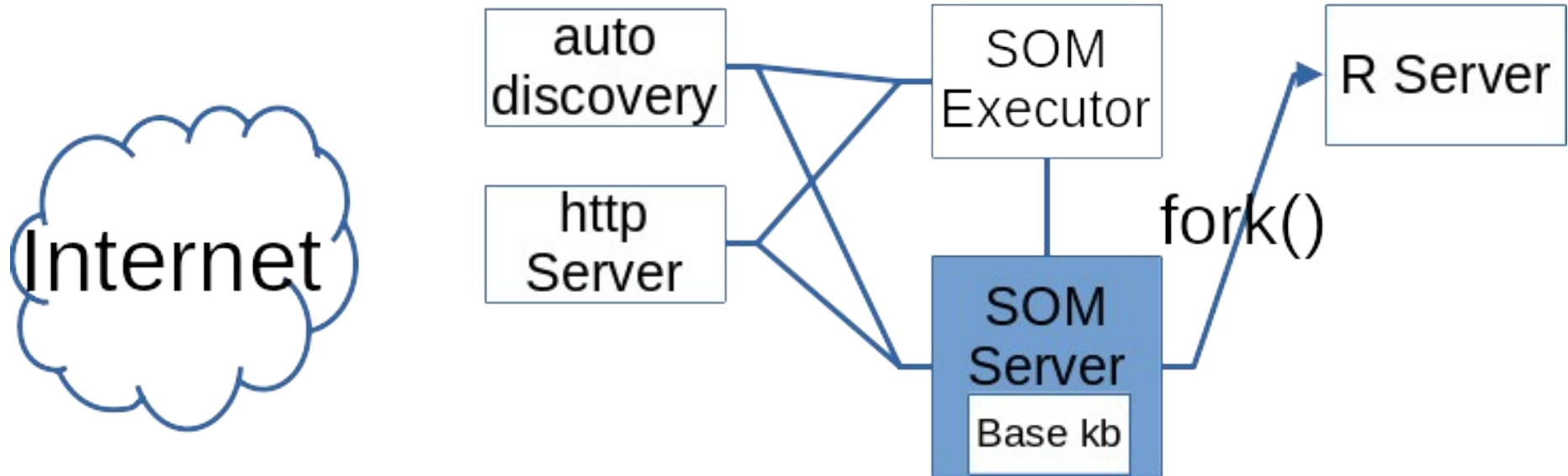
- Step 2: SOM server process reads base knowledge base
 - Read into shared memory
 - All users share one copy (like OS shared libraries)
 - All users' personal kbs are built upon base kb



HTTP Server Initialization:

- Step 3: Read and execute process specification file
 - Starts helper apps like R
 - Mathematica, Python/sympy

```
{ "type":  
  "processInitialization",  
  "name" : "stats",  
  "path"  : "somRApp",  
  "hostname" : "localhost",  
  "port": 58384  
}
```

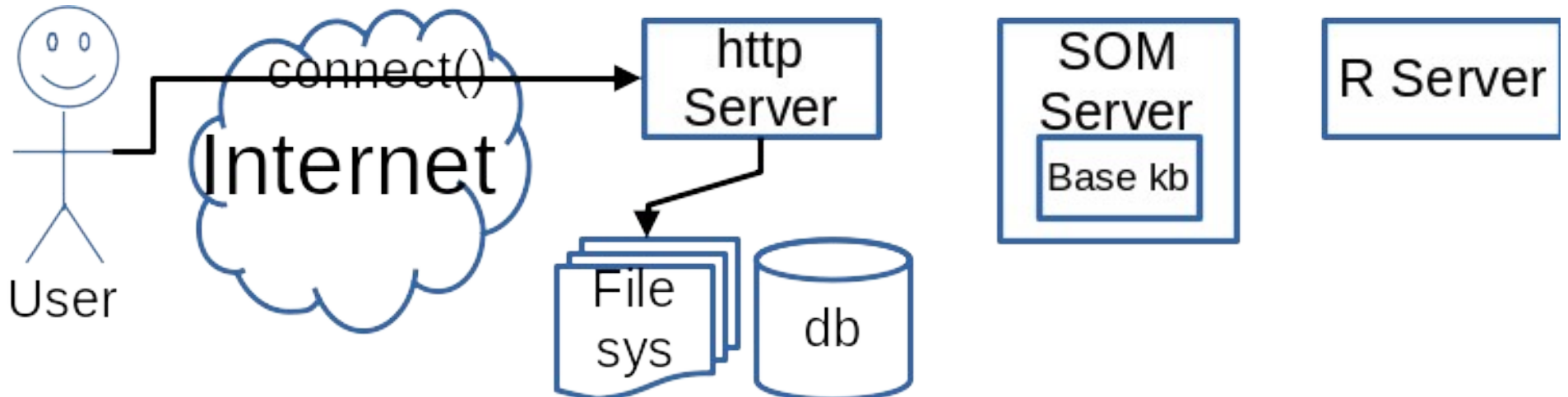


HTTP Server Initialization finished!

Now we are
ready for clients!

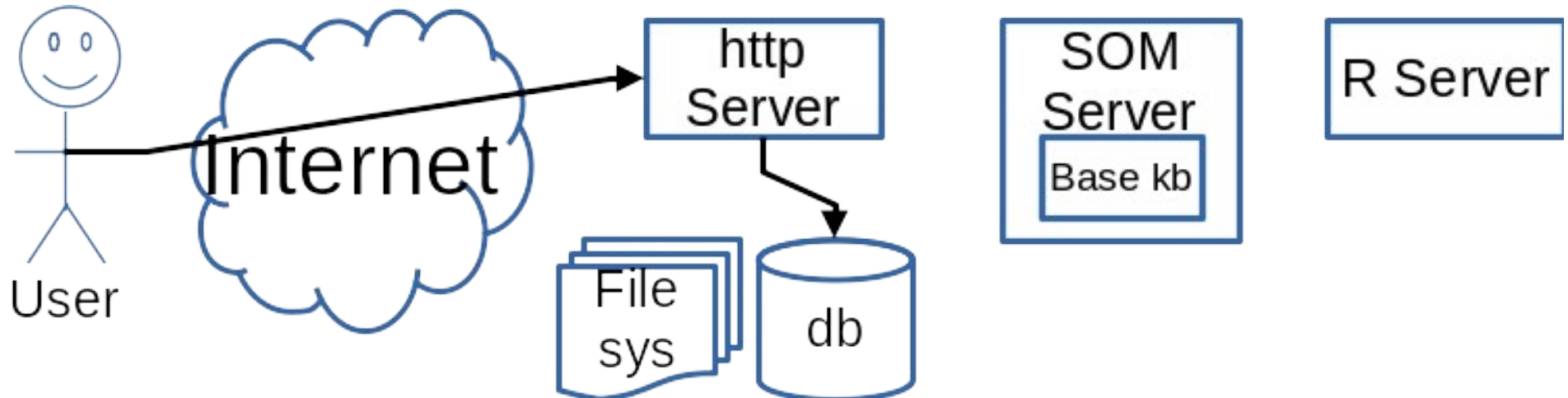
HTTP Server Operation:

- A user connects!
- Some resources can be returned immediately
 - Site home page
 - Common images



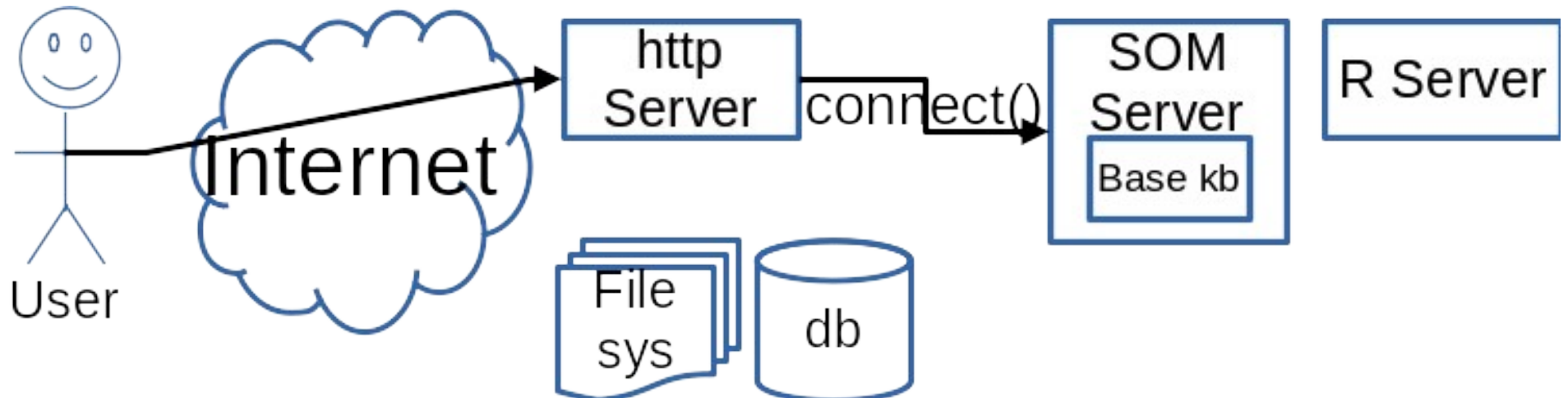
HTTP Server Operation:

- Other resources require to user to login
 - Manipulating groups
 - Messaging



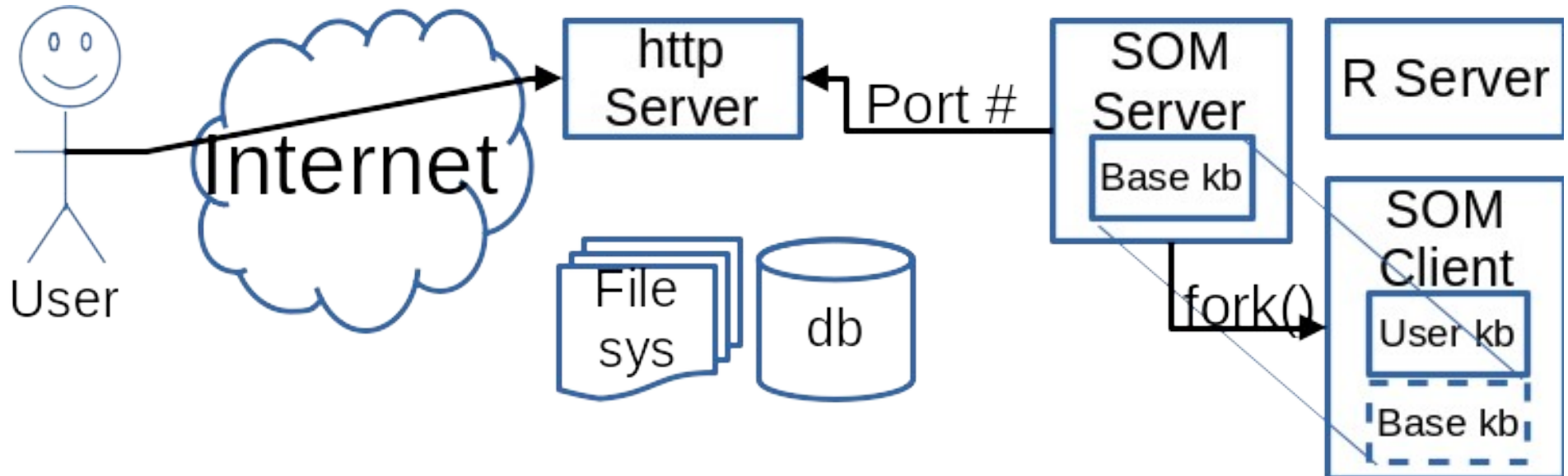
HTTP Server Operation:

- But if you want to use a kb, then must open kb
 - HTTP server `connect()` s to SOM server



HTTP Server Operation:

- SOM server `fork()`'s child process
 - Child process shares base kb already in memory
 - Child process adds user kb on top of base kb
 - SOM server sends port # of client to HTTP server

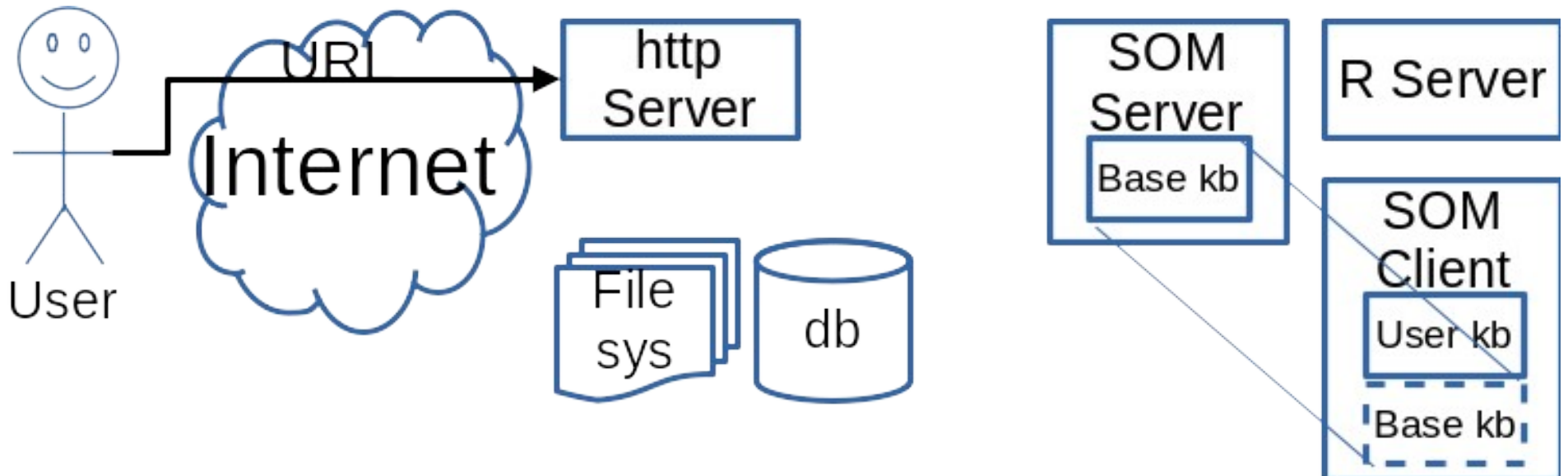


SOM Client Initialization finished!

Now the user can
use their kb!

SOM Client Operation:

- (1) User sends URL to HTTP server
 - Makes some request to knowledge base (kb)



SOM Client Operation:

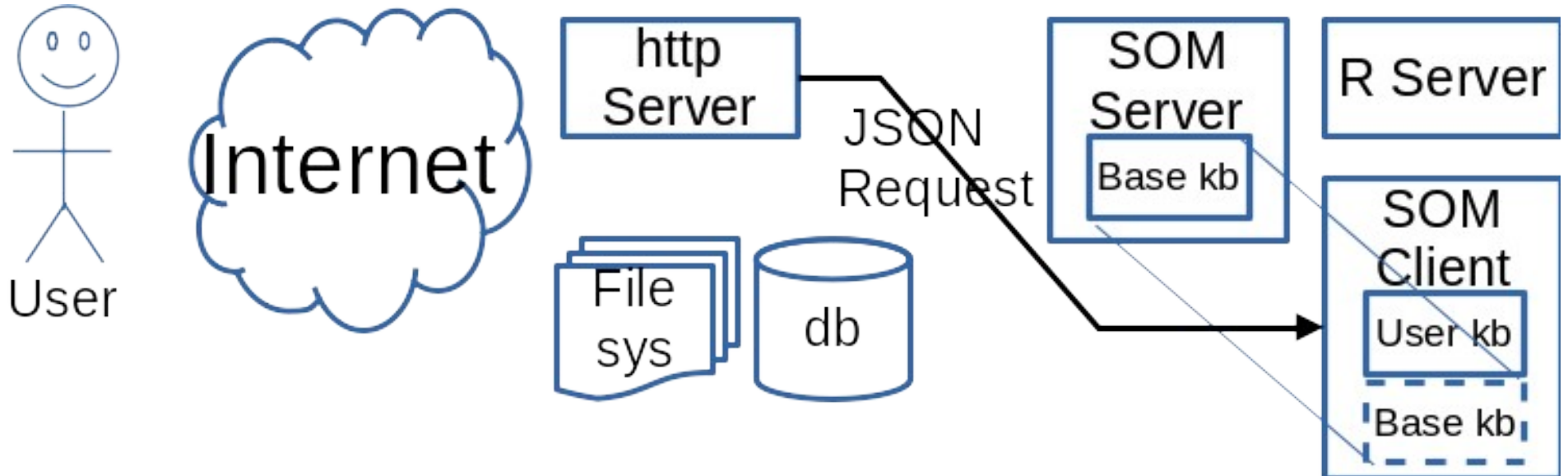
(2) HTTP server translates URL to JSON

3 possible formats:

- By POST (JSON in body)
- By URL query:
 - `?subject=obj&method=meth&arg0=0&arg1="Hello"`
 - means `obj->meth(0,"Hello");`
- By URL path: `/API/kb/nav/subject`

SOM Client Operation:

(3) HTTP server sends JSON to SOM client

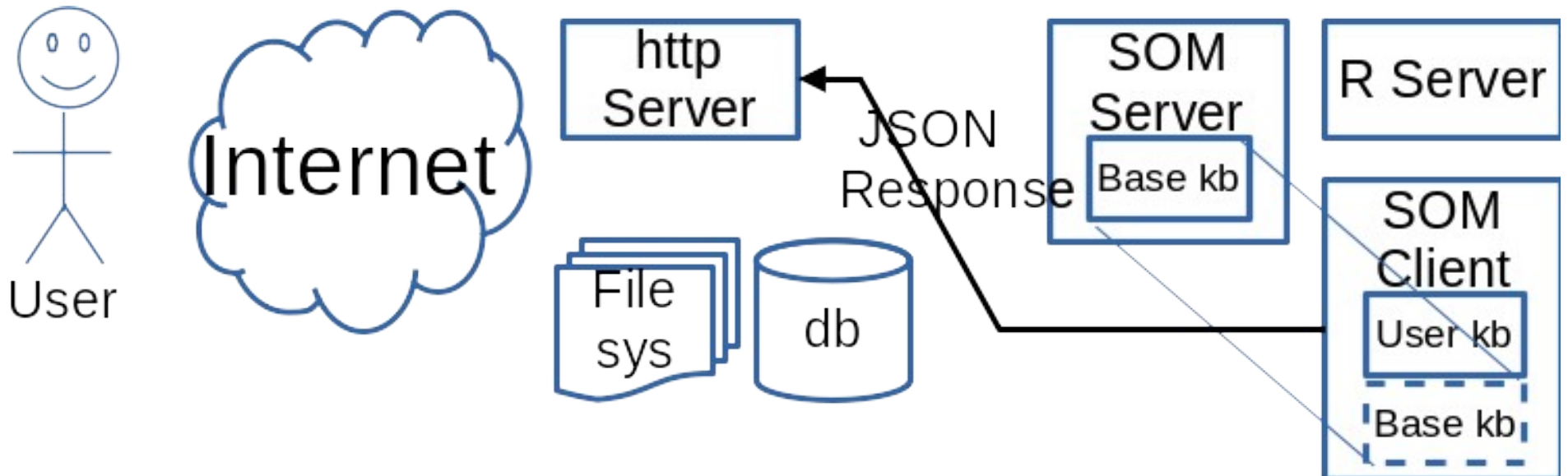


SOM Client Operation:

- (4) SOM client use kb to answer query
 - SOM method called to answer query
 - SOM has a `toJson()` method to format responses in JSON

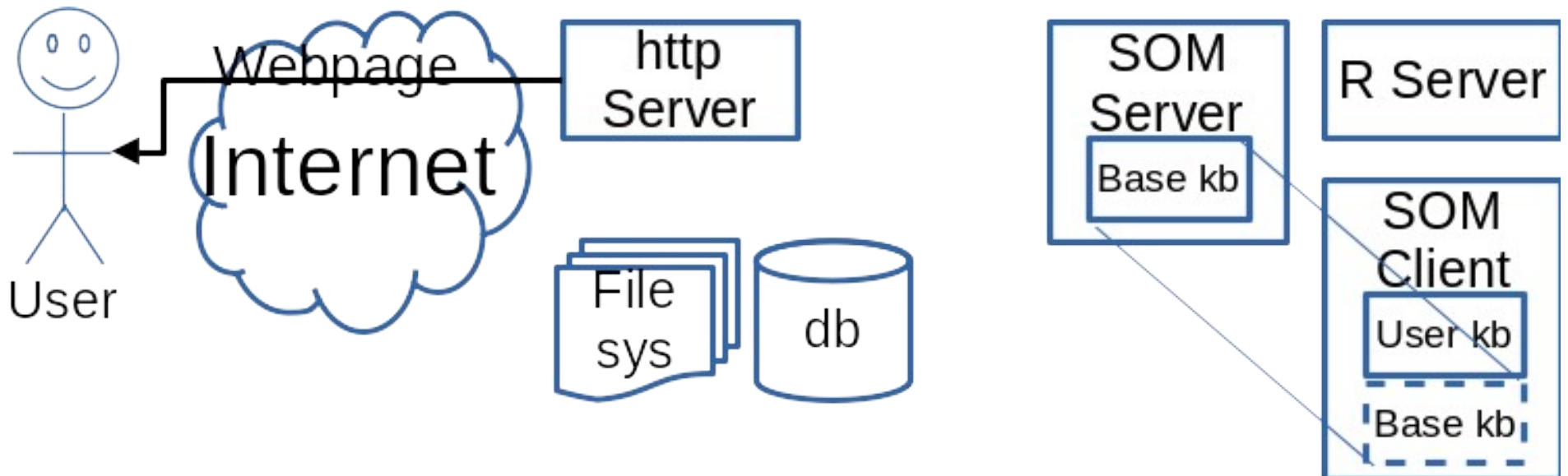
SOM Client Operation:

(5) SOM client sends response back to HTTP server in JSON



SOM Client Operation:

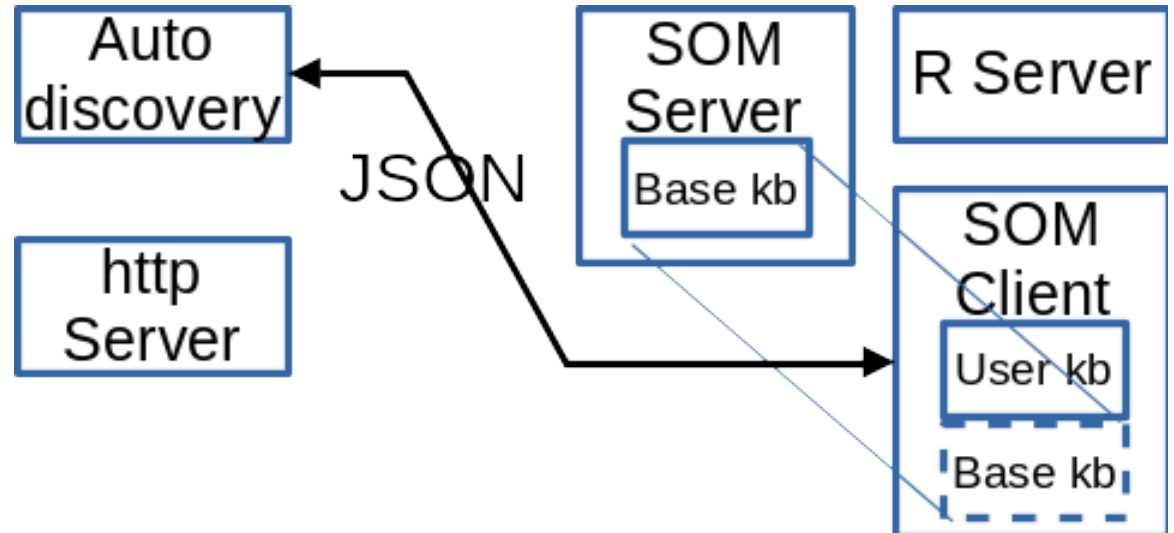
(6) HTTP server packages JSON into web page and sends response back to user



Auto discovery mode

Auto discoverer also sends JSON

- SOM server and client treat auto discovery just like HTTP server
- Science can be done while you sleep!

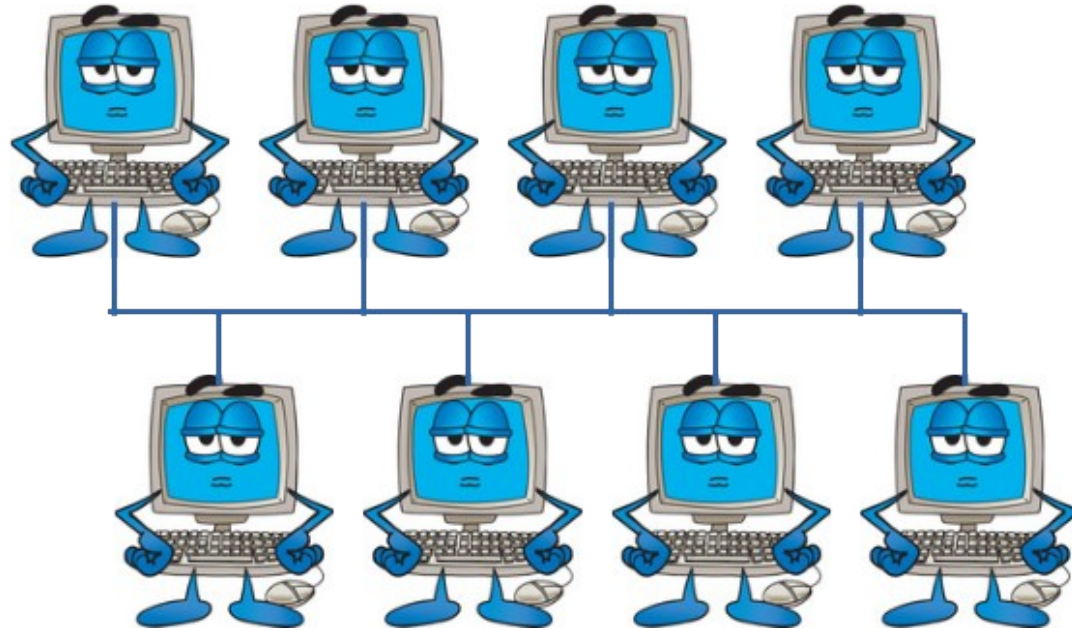


Advantages

- 1 HTTP server can be swapped out
- 2 SOM server, HTTP server and auto discoverer can run on different machines
- 3 If a SOM client crashes, no other clients affected

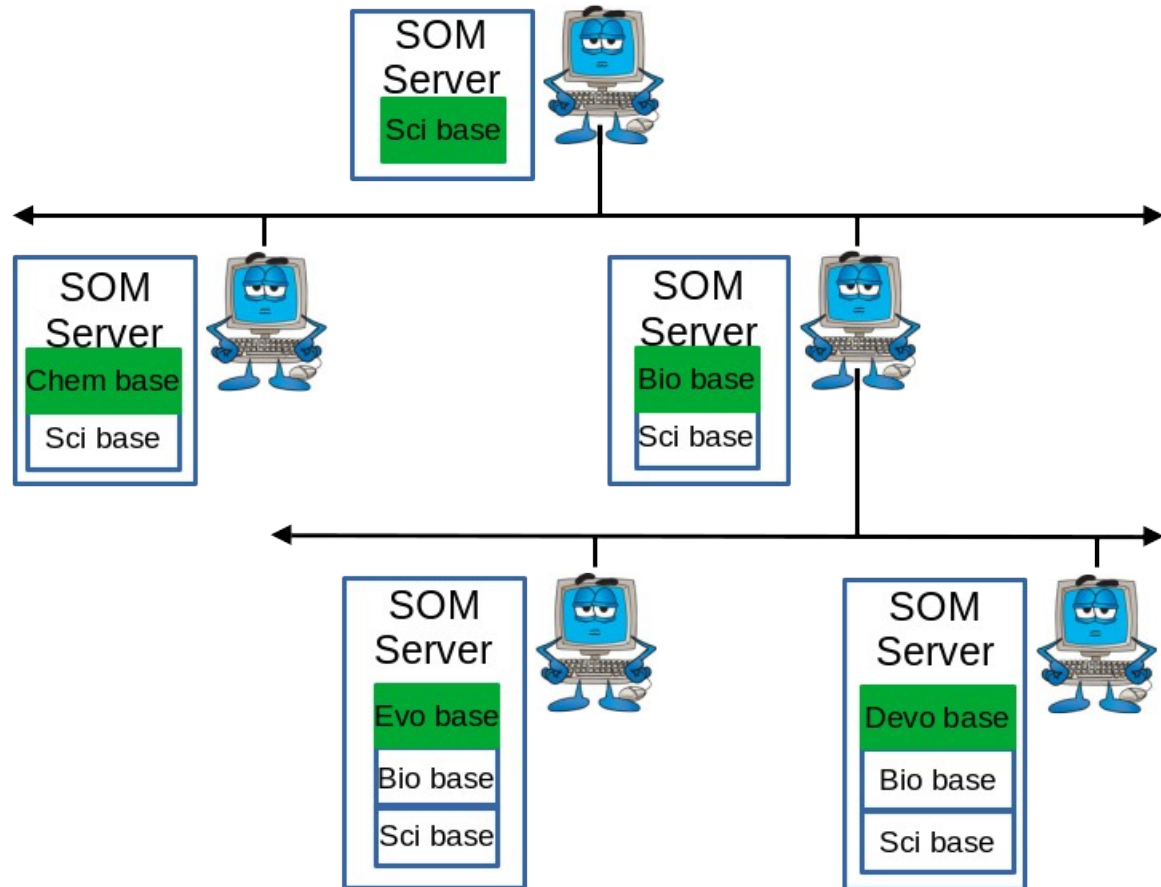
But Wait...
**THERE'S
MORE!**

Consider Several Scienceomatic Servers On A Computer Network

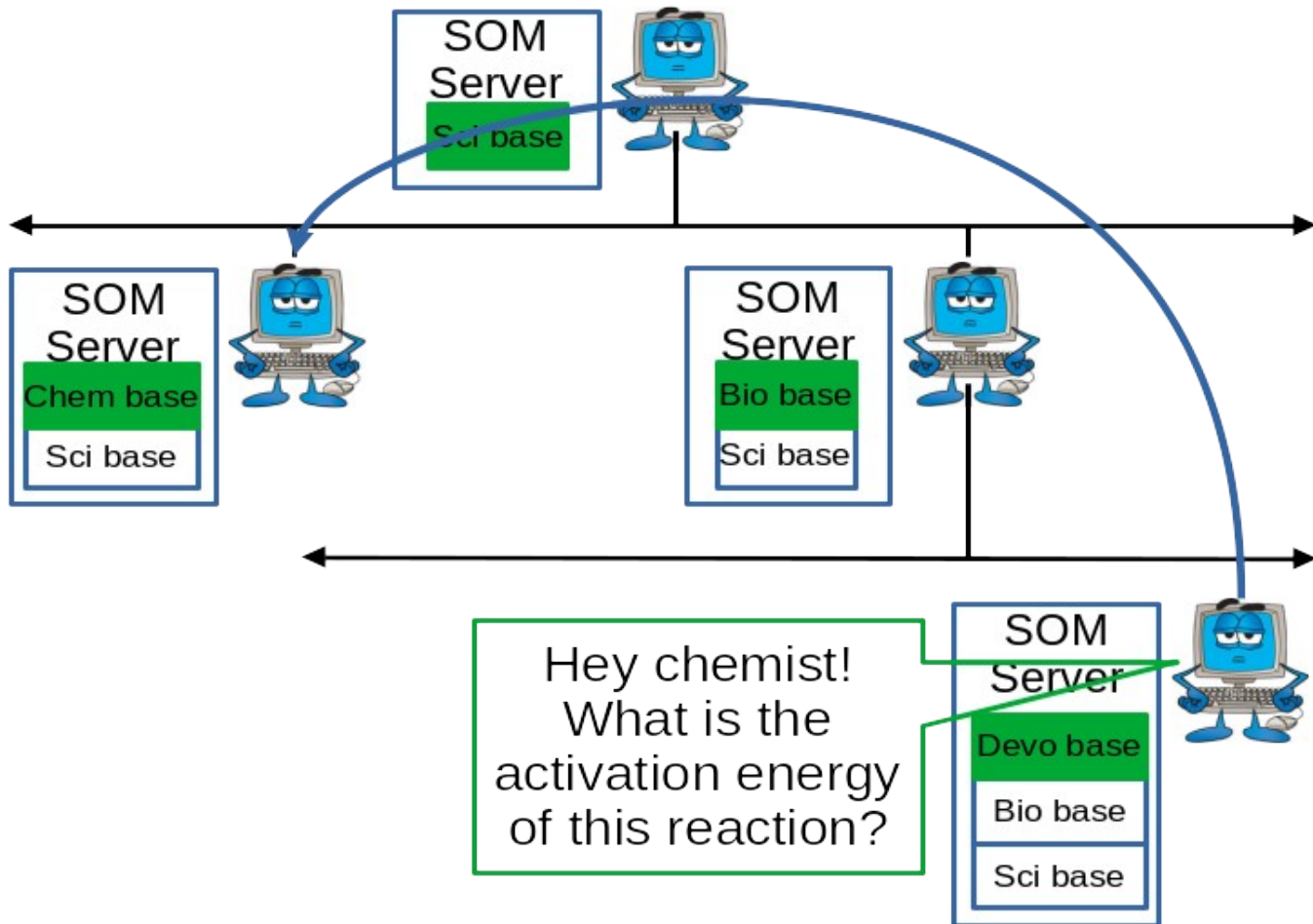


Multiple Distributed Kbs

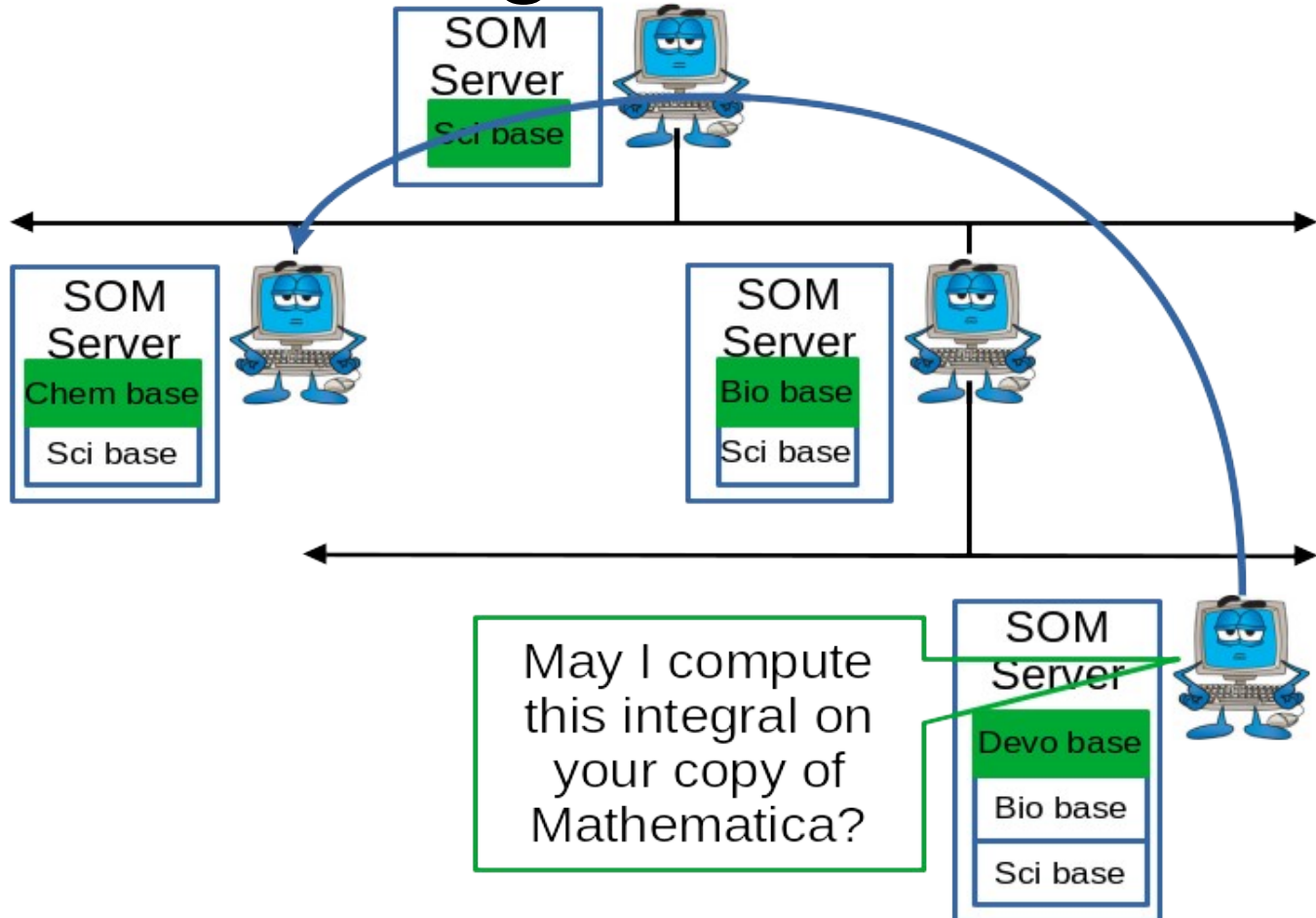
- Scienceomatic ontological tree
 - Kbs at root establish base ontology
 - Kbs towards leaves
 - agree on base ontology,
 - May disagree with each other



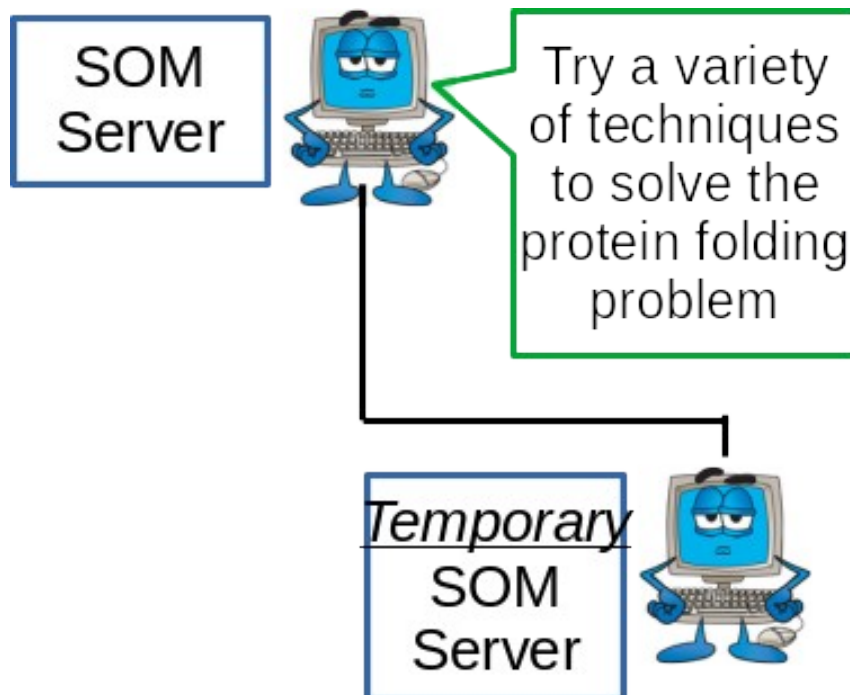
(1) Requesting remote knowledge



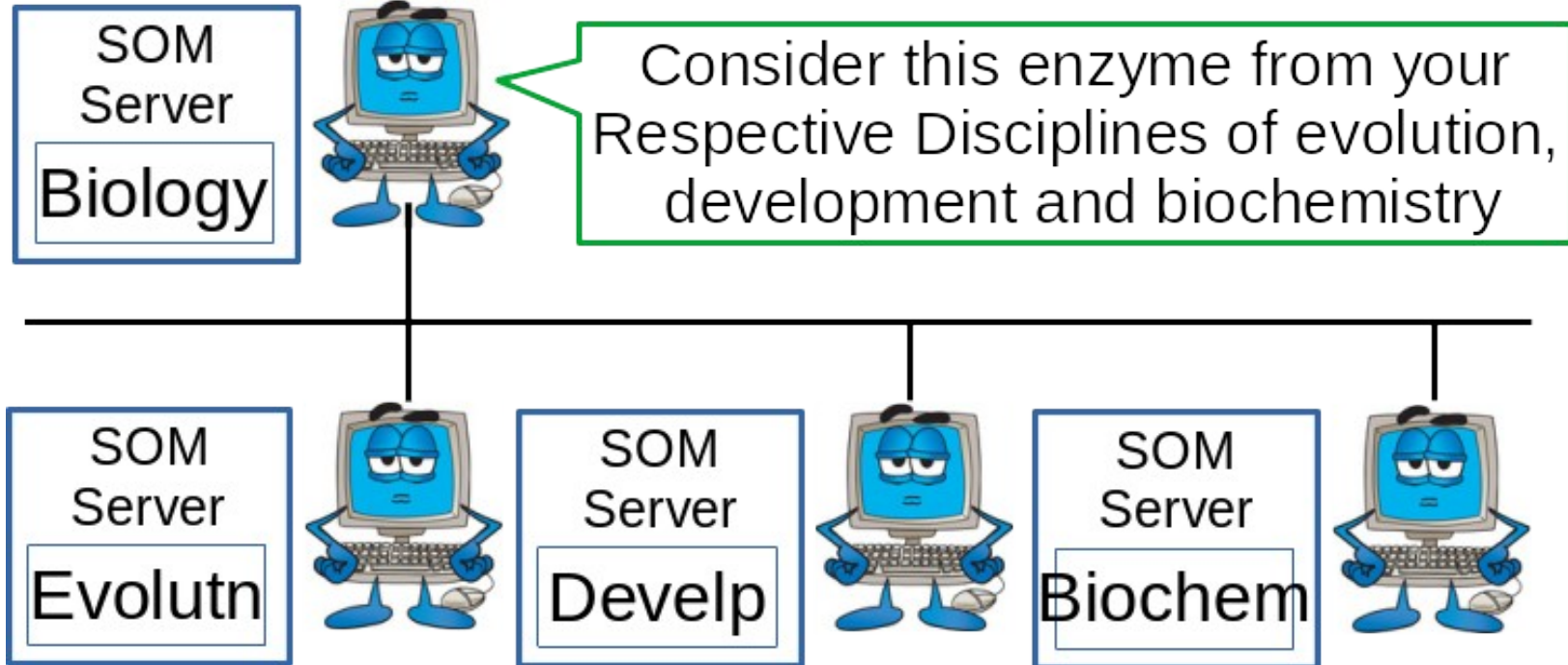
(2) Accessing Remote Services



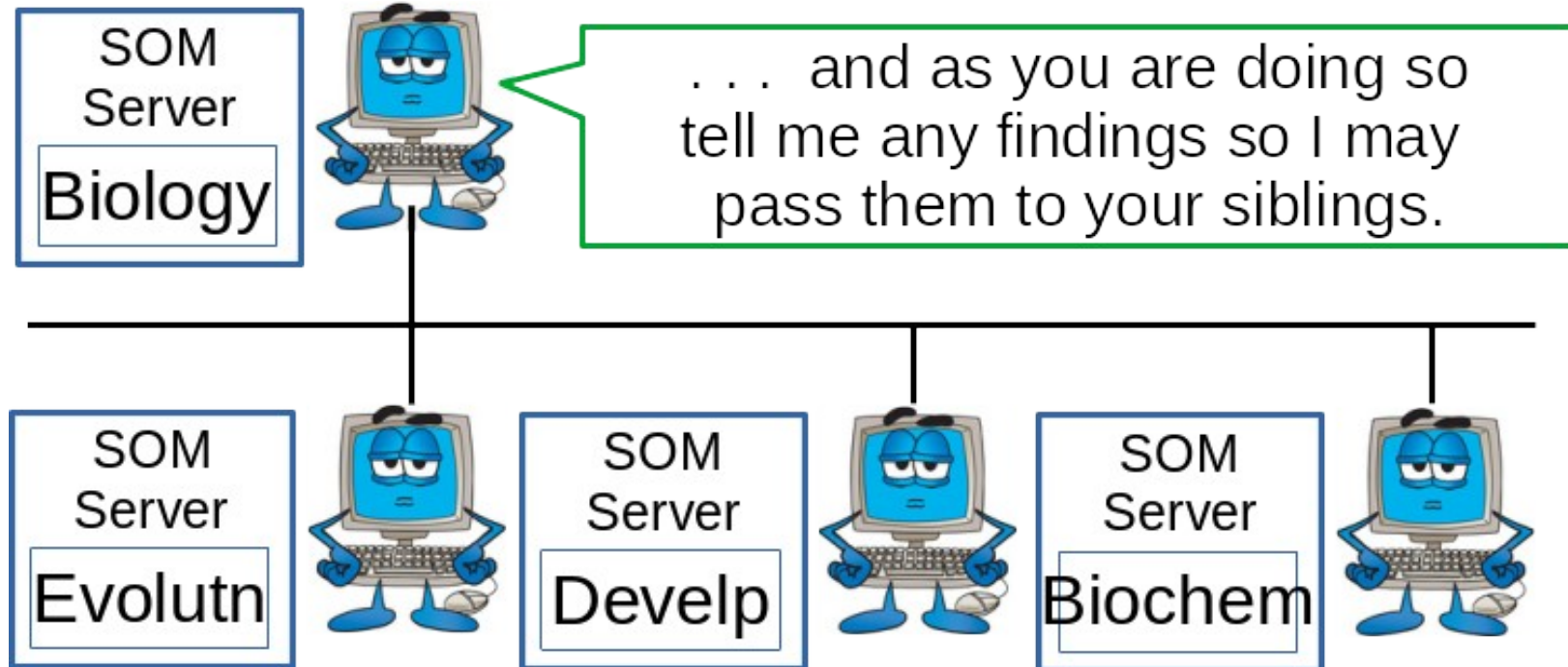
(3) Creating Subcontracted Kbs to Delve Into Specific Questions



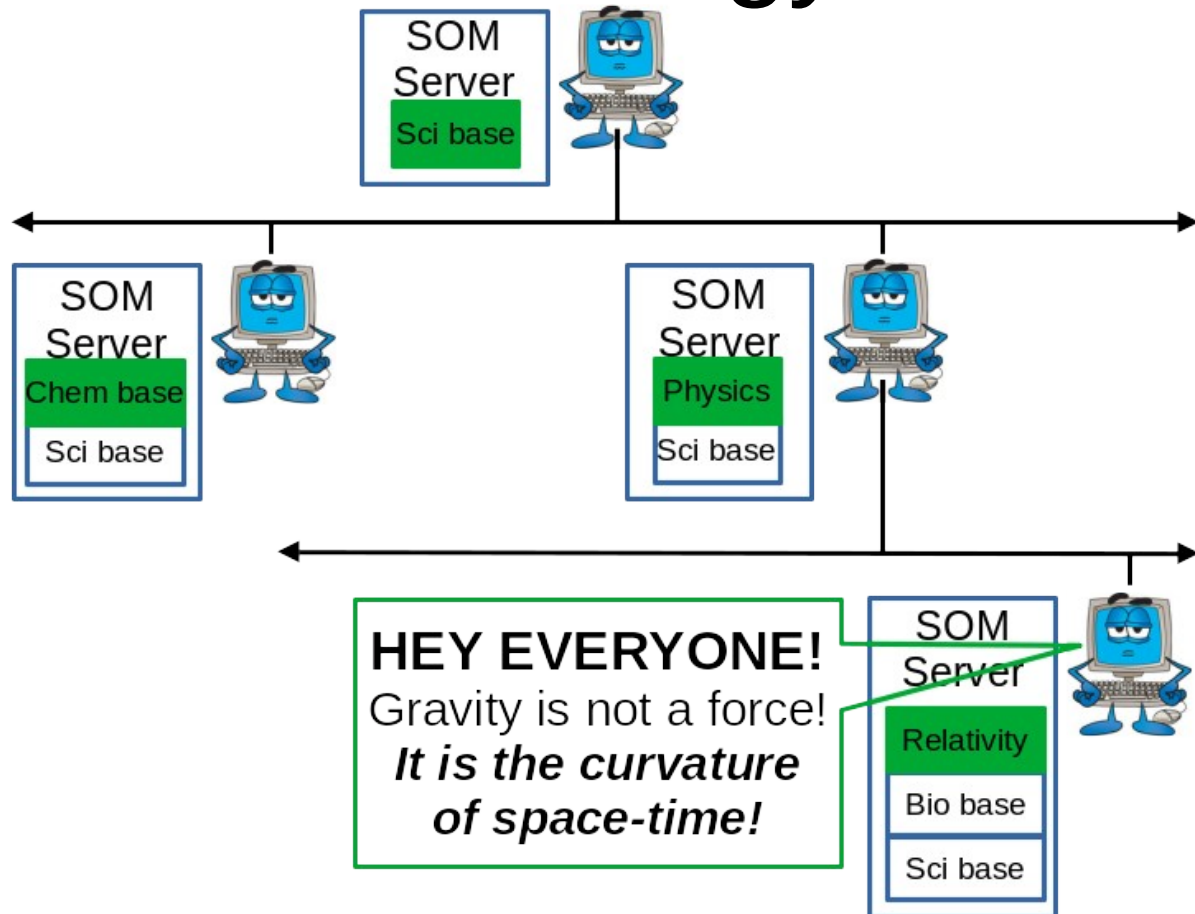
(4A) Supporting Interdisciplinary Research



(4B) Supporting Interdisciplinary Research

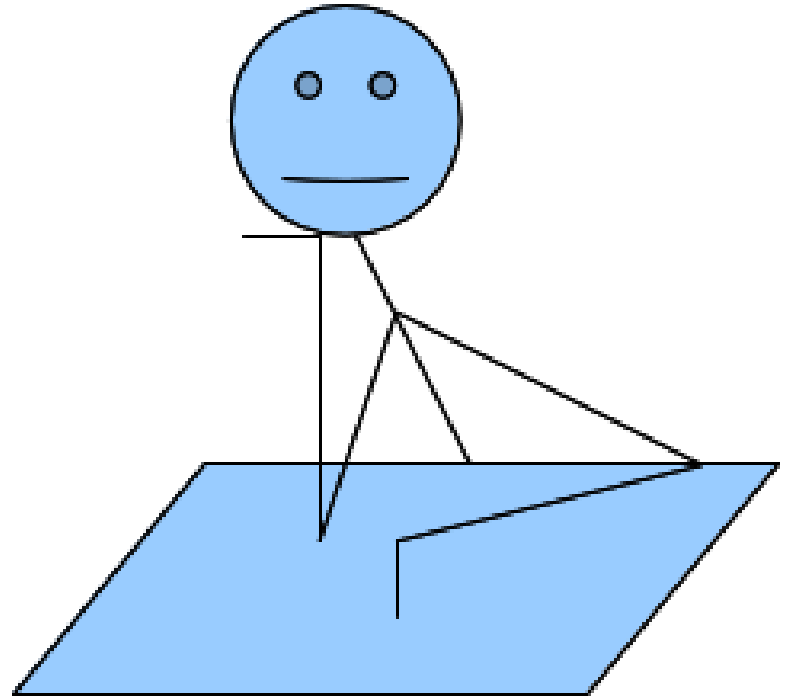


(5) Proposing Changes to Base Ontology



Concerned Scientist

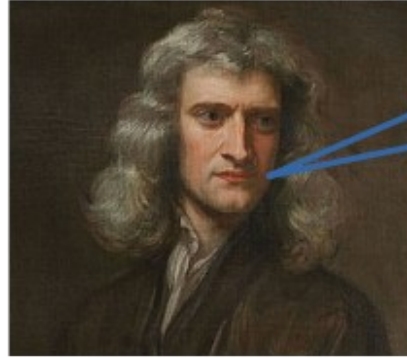
Say! What happens if not all users agree on the proposed kb change?



Thomas Kuhn's Reply



Time for a Revolution!



I prefer action at a distance in linear space



Dude! That's your loss.

