Parallel Programming Done Right with OTL and PPL

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About me

- Pascal programmer since 1984 (HiSoft pascal on ZX Spectrum)
- First contact with Borland: Turbo Pascal 3 (on CP/M)
- Programming highly responsive 24/7 applications since 1997
- Writer: The Delphi Magazine, Blaise Pascal, Monitor (Slovenia)
- Blogger: http://thedelphigeek.com
- Contact me: http://primoz.gabrijelcic.org

Multithreading

Multithreading is hard

“New programmers
are drawn to multithreading
like moths to flame,
with similar results.”

- Danny Thorpe

Solution

- Extract all hard parts into a boilerplate code.
- Test it. Test again. Test repeatedly.
- Reuse as much as possible.
- Test again. Don’t stop testing.

– or –

- Use existing library.
- Continue testing.

When to do it?

- Unblocking GUI
  - Long calculations
  - Synchronous APIs
    - File system
    - (Serial) communication
- Speeding up the computation
  - Faster calculation
    - More/less appropriate tasks (algorithms)
  - Serving more than one client at once

Patterns

Adapt algorithm to the pattern

- Don‘t write the code for your algorithm
- Decompose the algorithm into patterns
  - Use those patterns in the code

- When everything fails, go low-level
- Tasks first, threads last

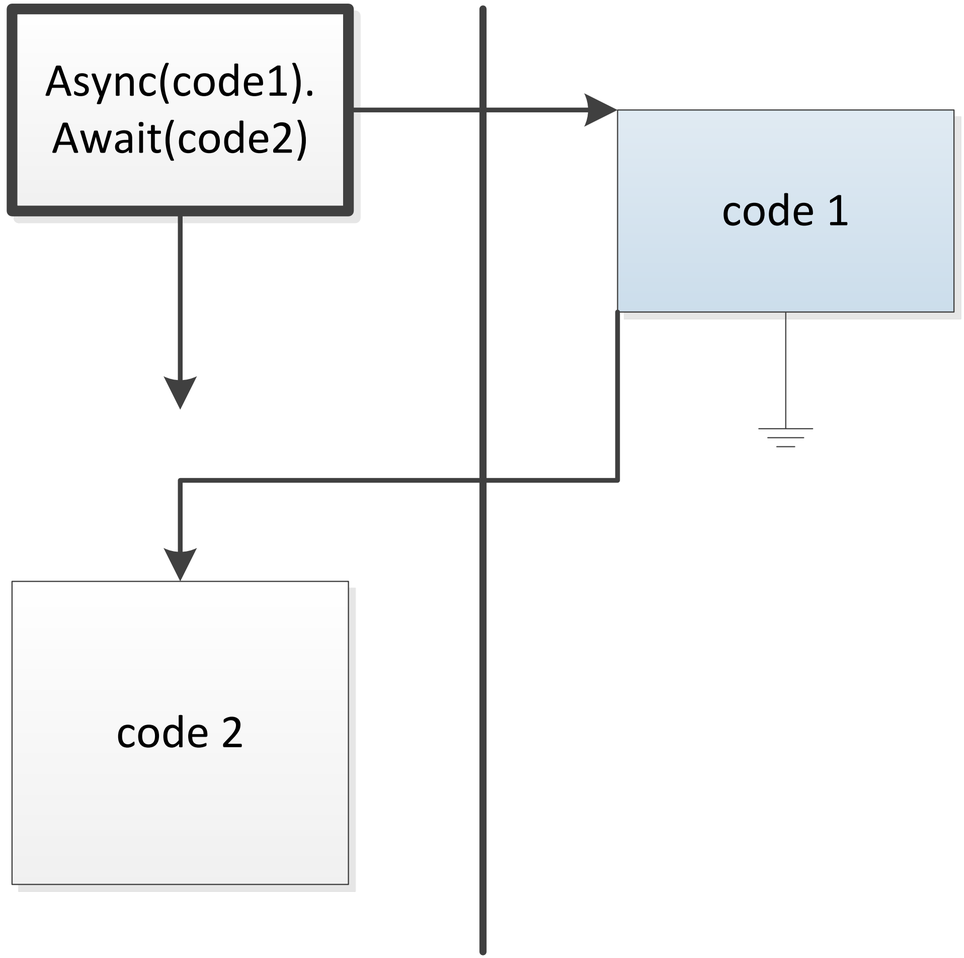
Frameworks

- PPL
  - Parallel Programming Library
  - XE7+, all platforms, RTL license
  - patterns: For, Future, Join
- OTL
  - OmniThreadLibrary
  - 2009+ (patterns), 2007+ (tasks), Windows (VCL/console/service) only, OpenBSD license
  - patterns: Async[/Await], Background worker, For, Fork/Join, Future, Join, Map, Parallel task, Pipeline
  - http://www.omnithreadlibrary.com/

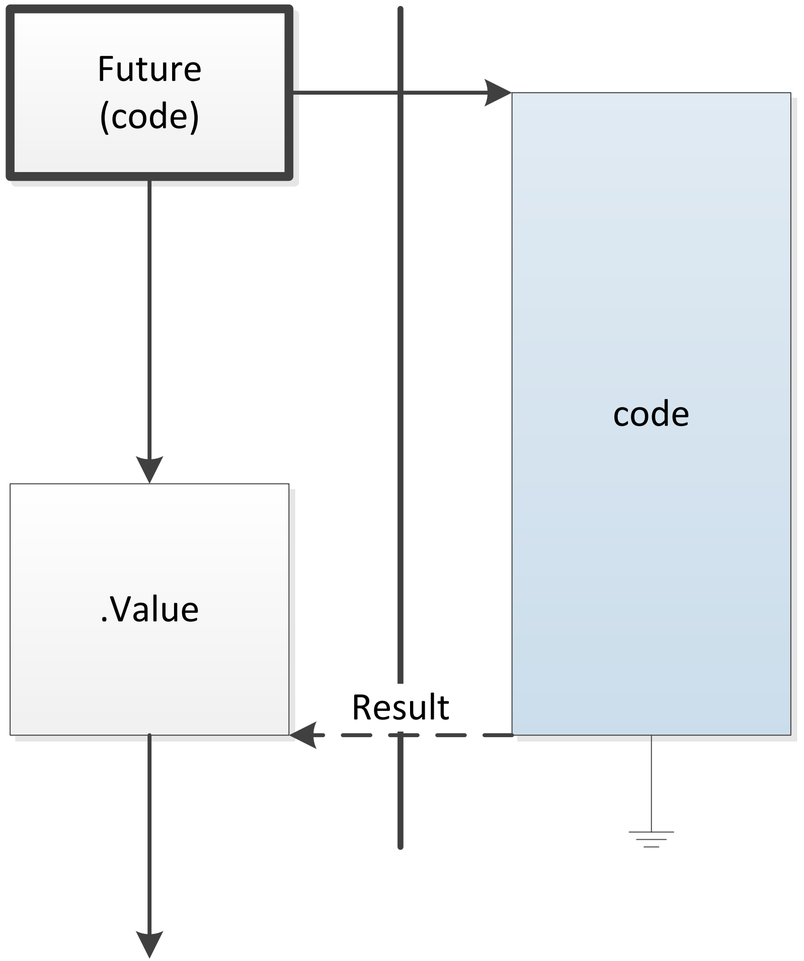
Dish of the day

- Async/Await
  - Fire asynchronous tasks
- Future
  - Execute long calculation in background
- For
  - Use all of available CPUs when processing large data
- Map
  - Converting data in parallel
- TimedTask
  - Just like TTimer, but running in a thread

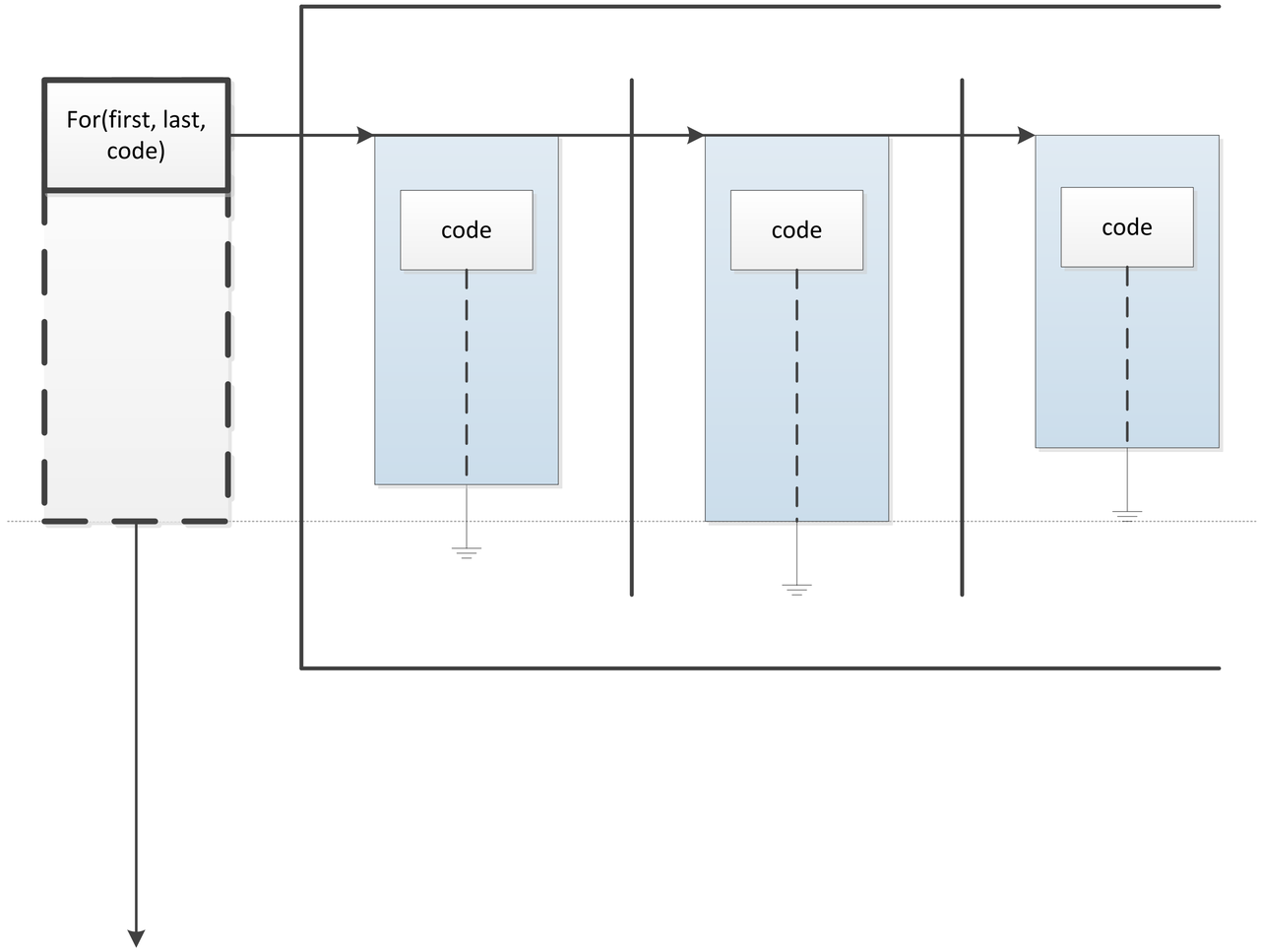
Async/Await



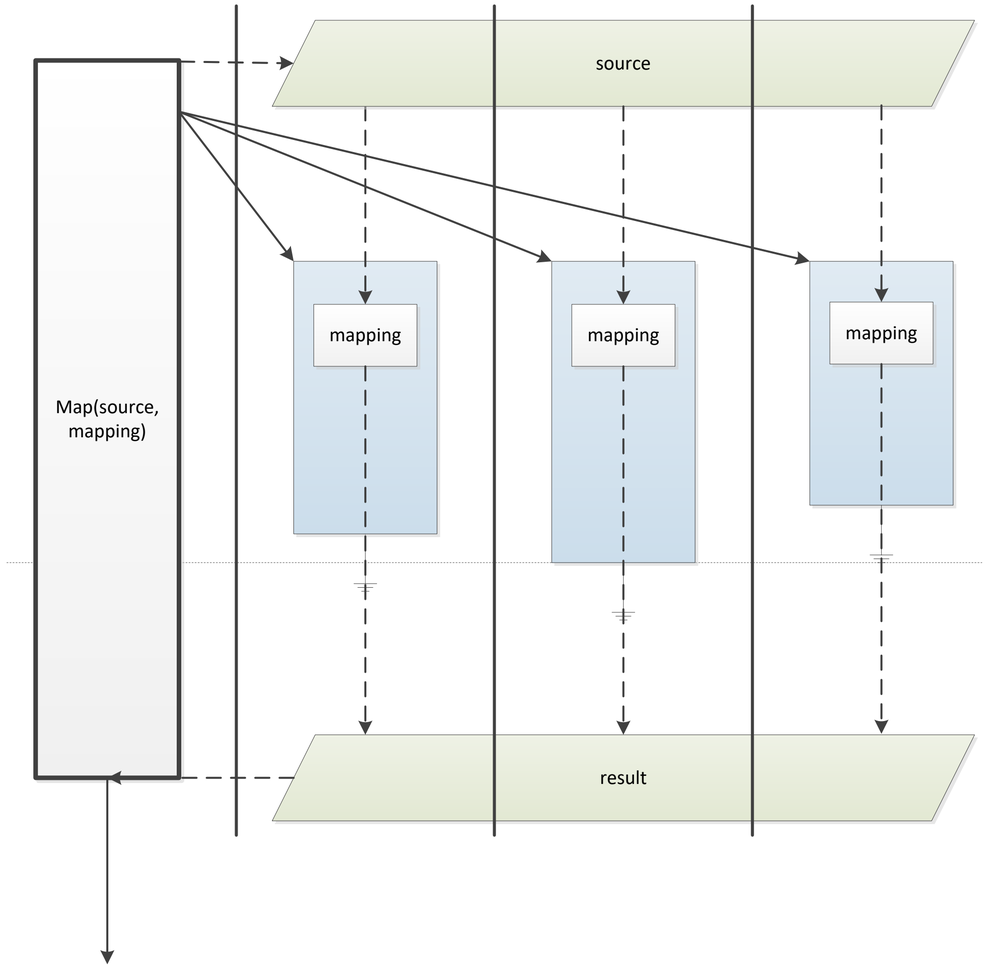
Future



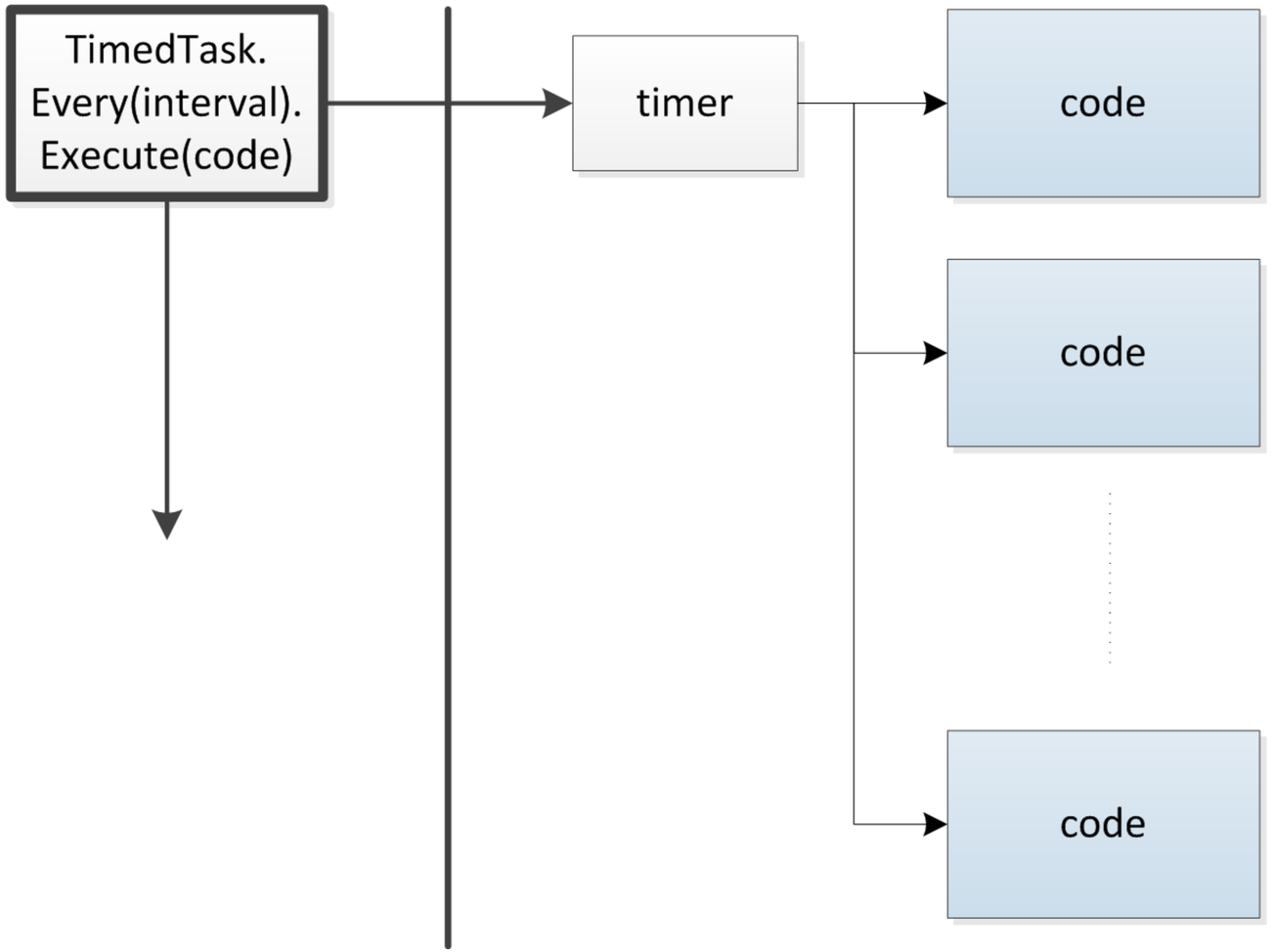
For



Map

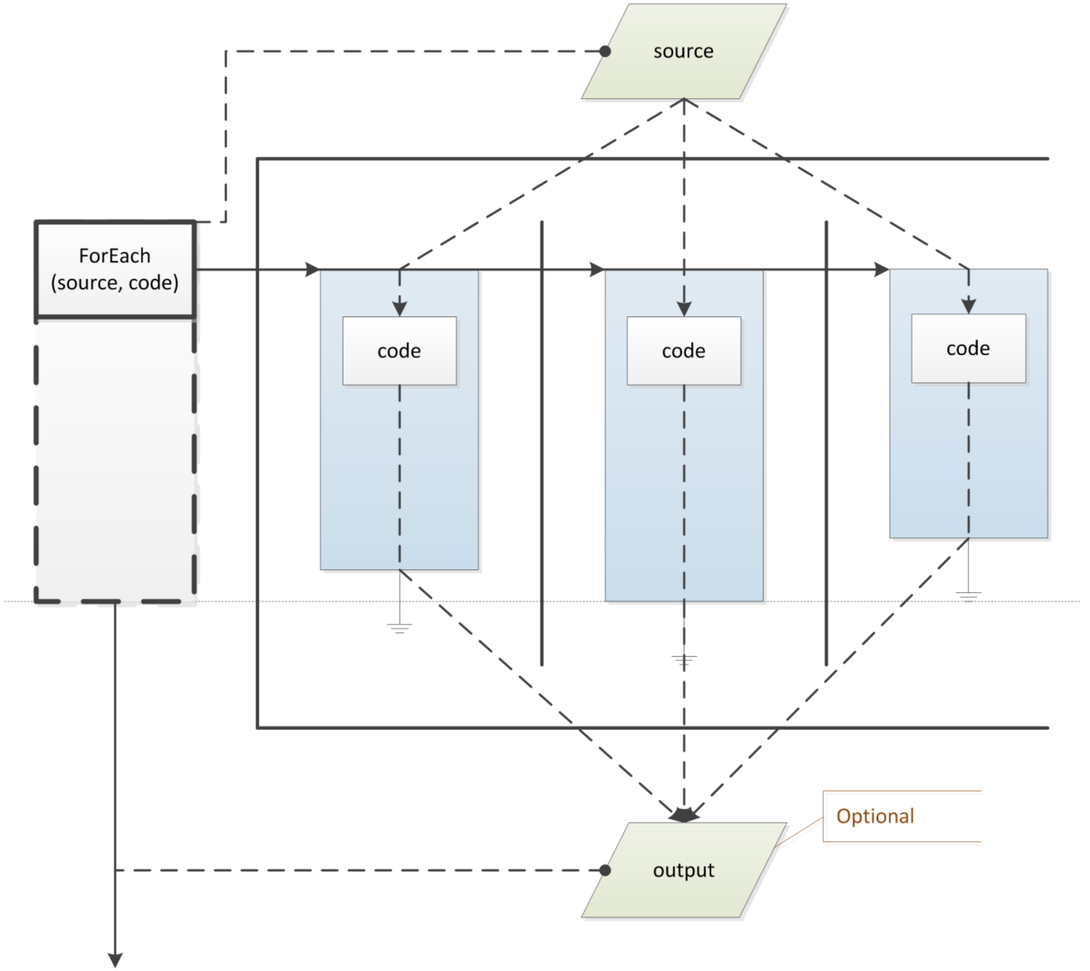


TimedTask

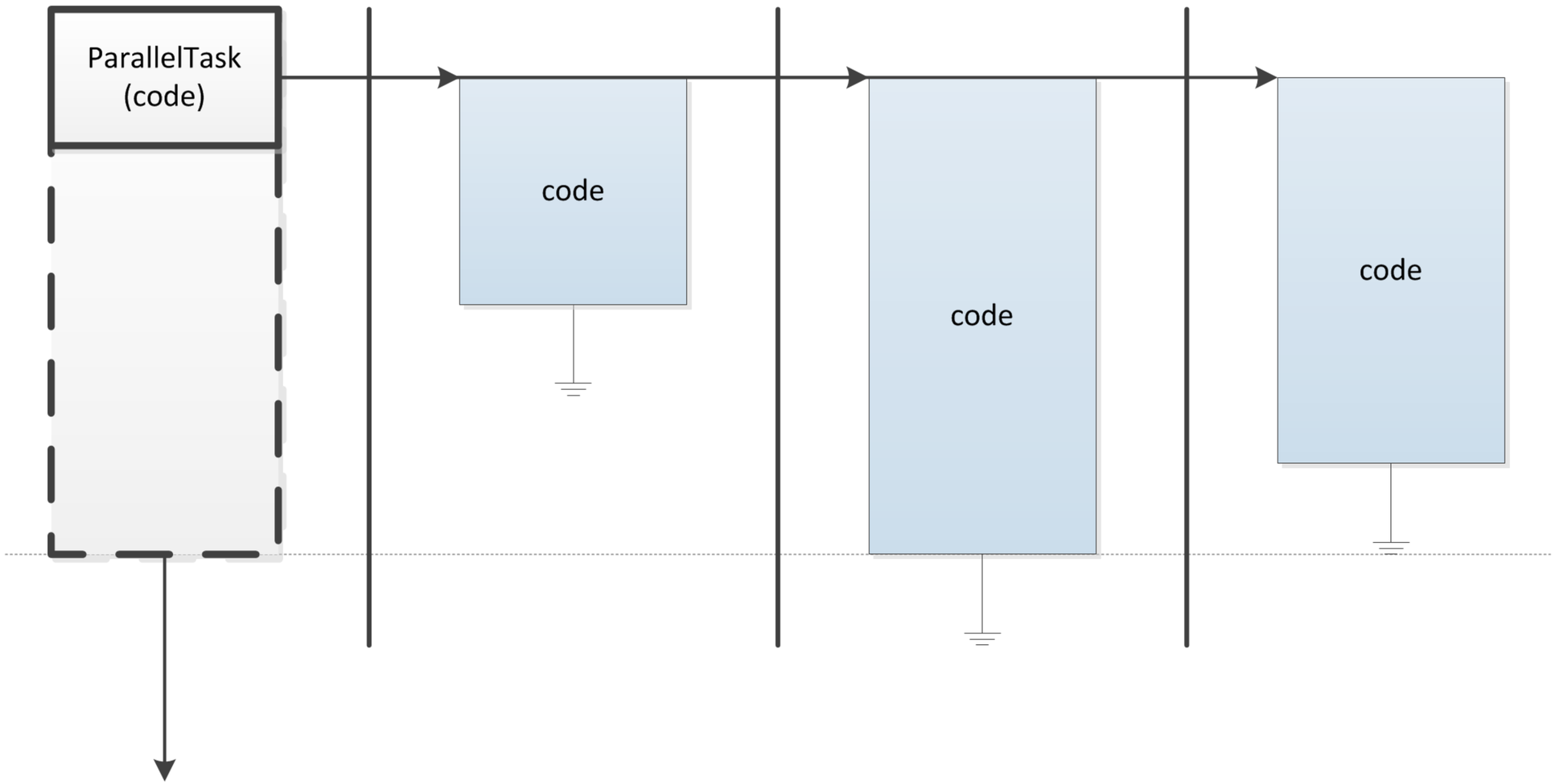

TimedTask.
Every(interval).
Execute(code)
timer
code
code
code

Other OmniThreadLibrary patterns

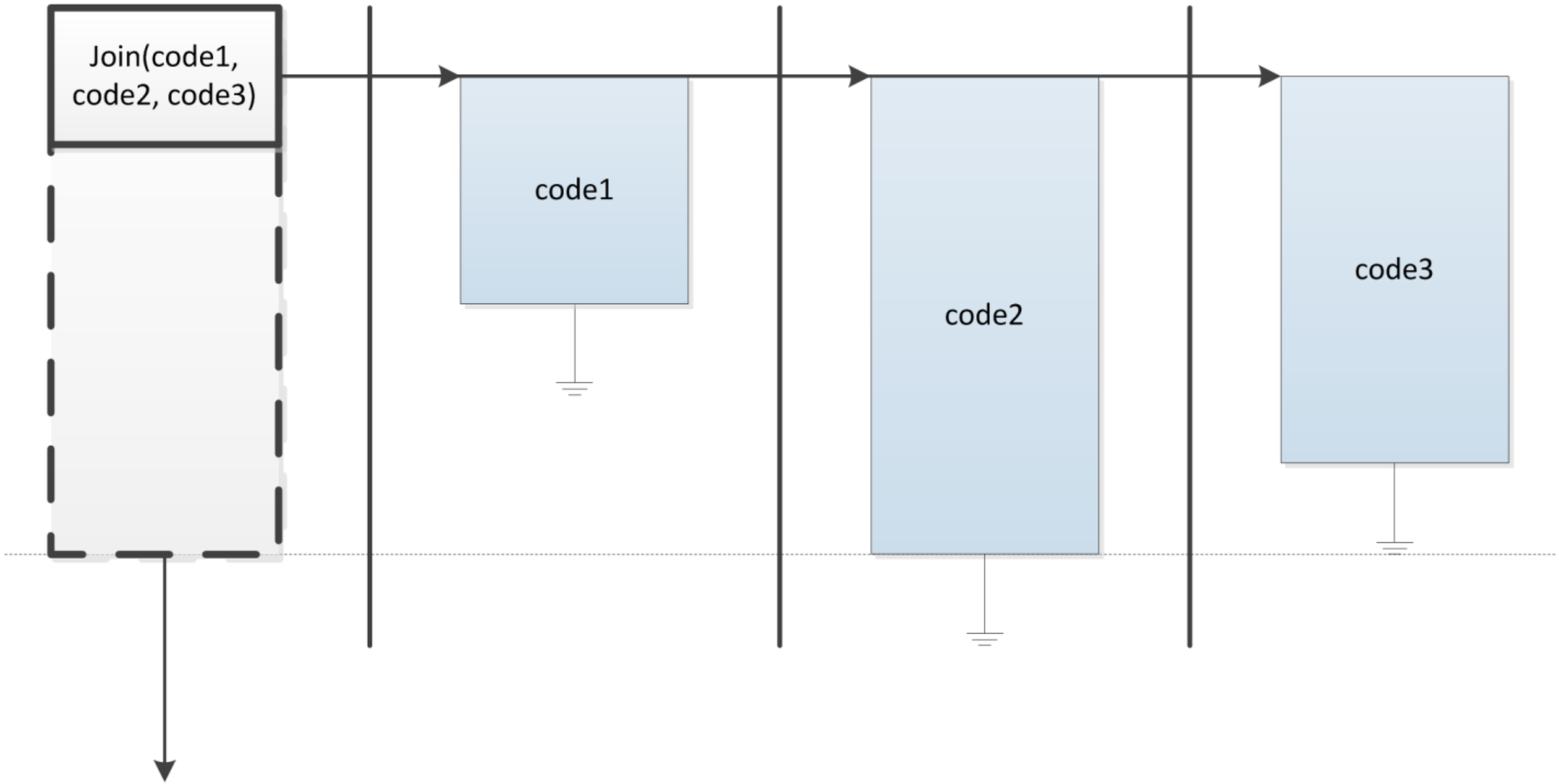
ForEach



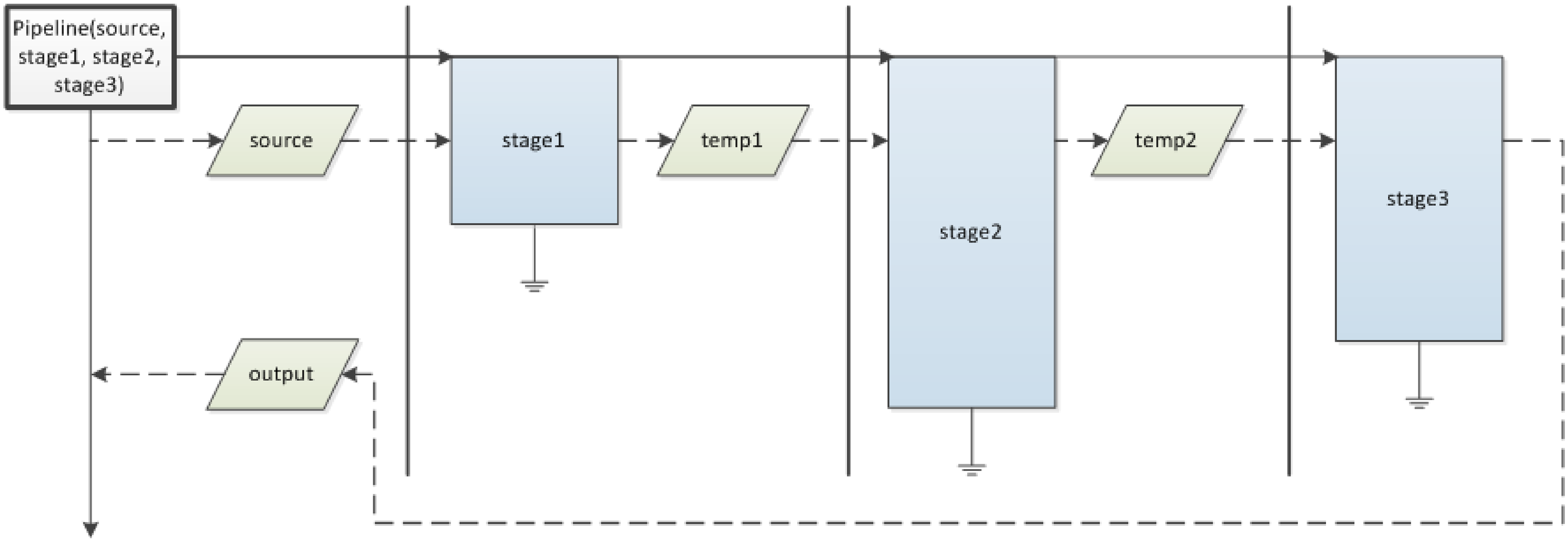
ParallelTask



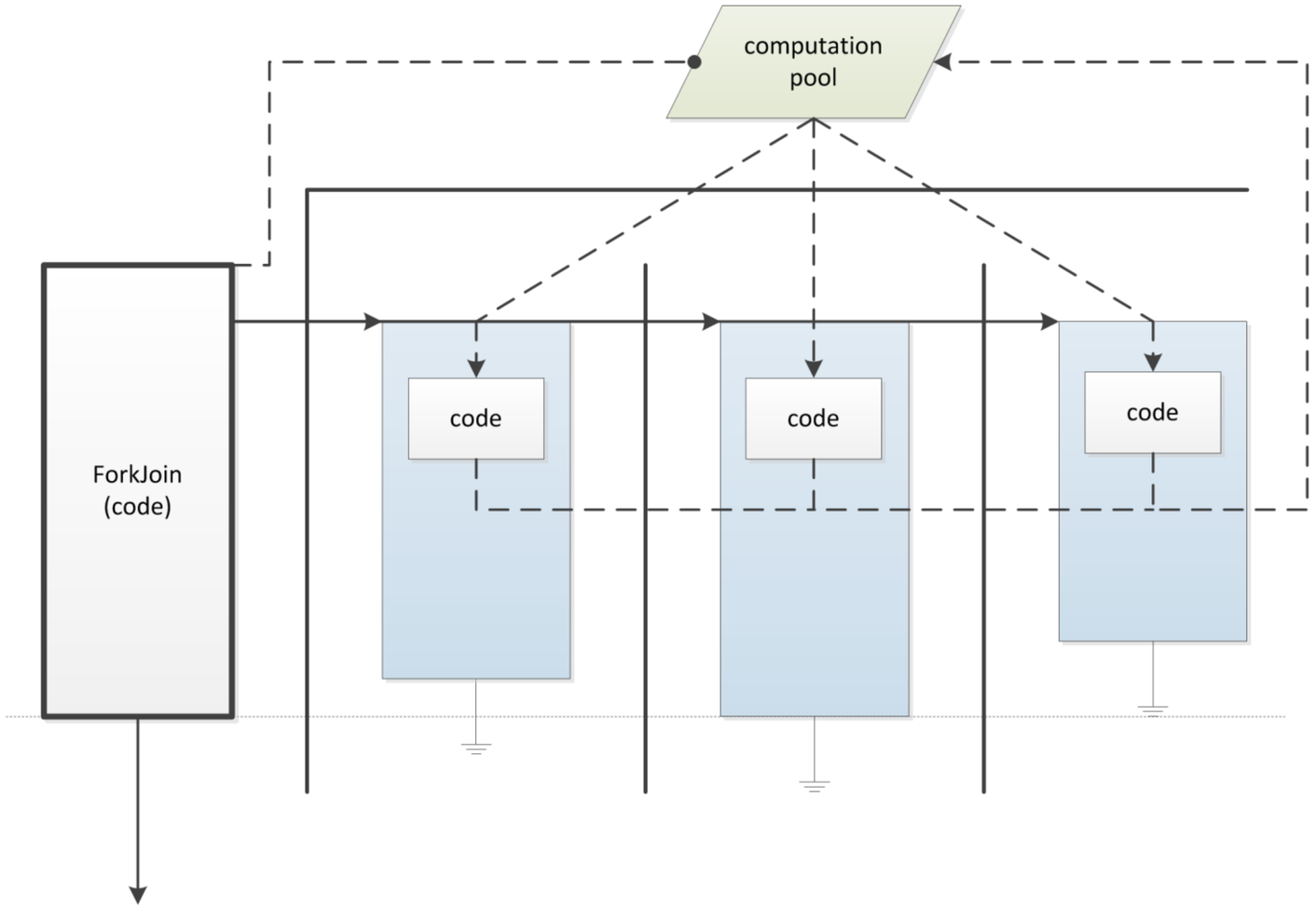
Join



Pipeline

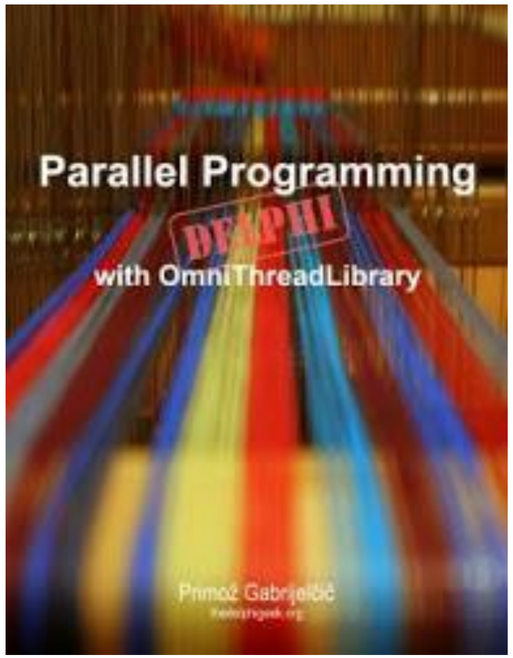

Pipeline(source, stage1, stage2, stage3)
source
stage1
temp1
stage2
temp2
stage3
output

Fork/Join



Get more information

- http://www.omnithreadlibrary.com/tutorials.htm
- “Parallel Programming with OmniThreadLibrary”
  - https://leanpub.com/omnithreadlibrary
  - http://otl.17slon.com/book



Keep in mind

Important Facts We Learned Today

- Don’t write boilerplate code – use patterns
- Be careful when accessing shared data
- Never access the GUI from a background thread!

Q & A