Nim Containertools:

My HackWeek-22 project

andrea.manzini@suse.com

Project scope and purpose

- **Practice** with Nim advanced features like macros and metaprogramming
- Play with **container** technology
- Develop a POC that can be expanded for future cases
- Use **Test Driven Development** methodology to design and develop code
- Have fun and try out something different
- **Publish** something on official nimble package directory: https://nimble.directory/pkg/containertools

the Nim programming language

Efficient, expressive, elegant

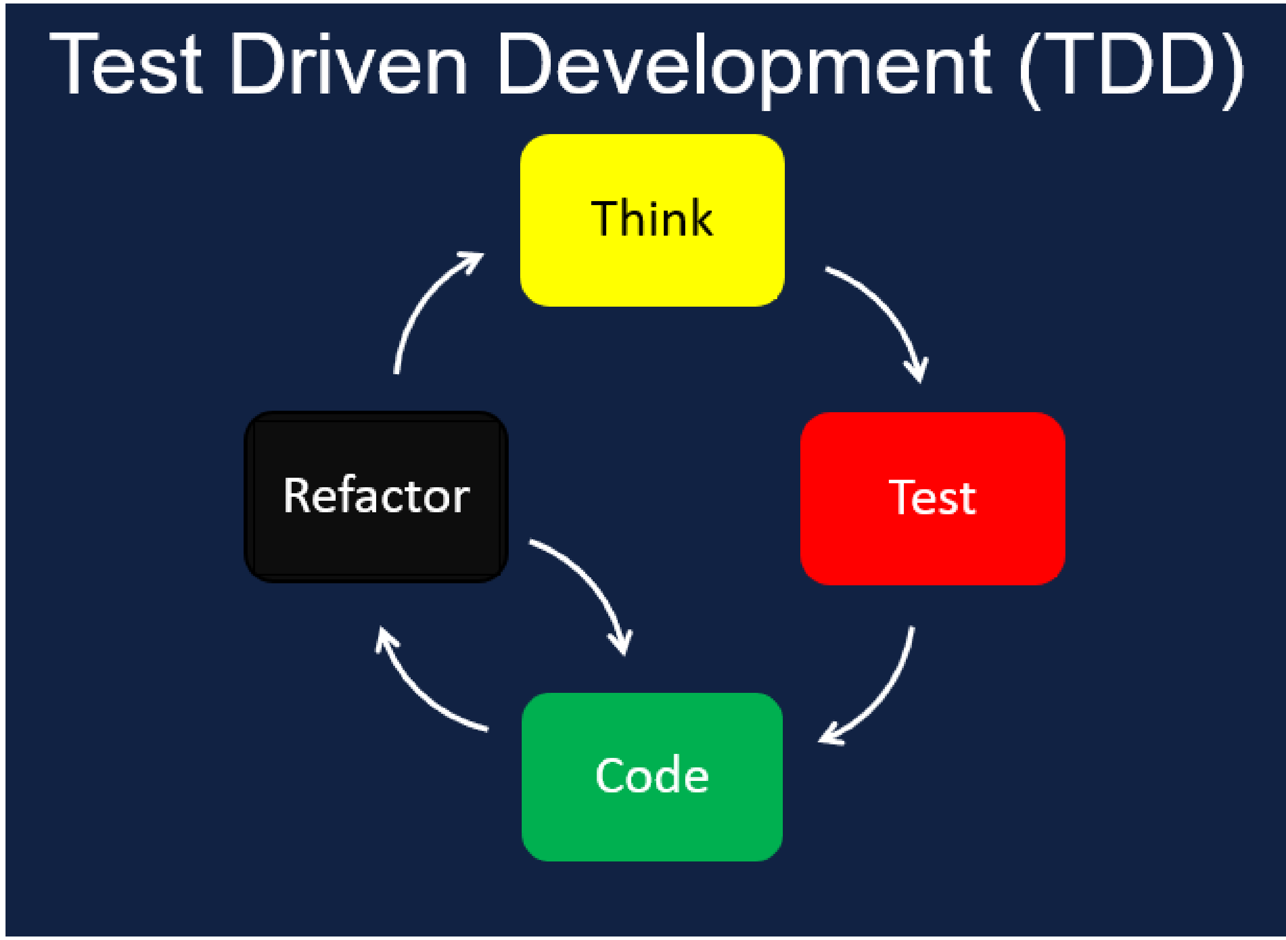
Nim is a statically typed compiled systems programming language.

- Intuitive and clean syntax, inspired from Python, Ada and Modula.
- Support for multiple operating systems
- Compiles to native binary or Javascript
- Easy C, C++ and objC wrapping
- Decentralised package management
- trivia: openSUSE has *"first-class support"* for the Nim language (phoronix)

Feel free to join `#discuss-nim` slack channel

Whole project was developed using Test Driven Design/Development process

1. Think of a feature
2. Write a failing test
3. Write just enough code to pass the test
4. Refactor when needed
5. Goto step 1



Hello, ContainerTools

`Containerfile` declarative syntax is static and can be error prone. The library provides a **DSL** (Domain Specific Language) that enables a dynamic behaviour, while the strict checking of the Nim compiler ensure correctness.

```
import containertools
let image = container:
    FROM "opensuse/leap"
    CMD "echo Hello"

image.save "Containerfile"
image.build
```

Static typechecking safety ...

```
import containertools
let image = container:
   FROM nginx
   COPY index.html /usr/share/nginx/html
   EXPOSE 8O8O
   CMD ["nginx", "-g", "daemon off;"]
image.save "Containerfile"
image.build
```

oops, we did an error. Can you spot it ?

... ensured by the compiler

```
$ nim compile
error.nim(5, 11) Error: invalid token. Expected a numeric value
```

Easiness of declarative syntax ...

```
import std/[strformat, times]
import containertools

for distro in ["leap","tumbleweed"]:
    let image = container:
        FROM "opensuse/" & distro
        if distro=="tumbleweed": # this a is Nim statement
          RUN "zypper -n install mypkg"
        CMD &"echo Hello from {distro} container built on {now()}"
    image.save "Containerfile." & distro
    image.build
```

... with the power of a programming language

we can also import an "existing" `Containerfile` and check it for errors, suggest optimizations and fix security issues

How can it be useful for SUSE ?

Writing declarative files (YAML?) is getting more and more common (`Dockerfiles`, `K8S` definitions, `CI actions`, `openQA schedules`) but as the size grows, they get tedious to maintain and error-prone

- Having the support of a strong typed compiler and tooling helps to increase flexibility, modularity and reduce human errors
- The library can also work as a **linter**: import/parse an existing declarative definition (provided from customer ?) and give hints about possible optimizations or security issues

Lessons taken

- having a good testsuite gives you freedom to a fearless refactor. During the design phase I used the growing test suite as a platform to try out new ideas
- TDD lets you think from the user's perspective
- Metaprogramming can be hard but is very powerful and expressive
- It's always OSS, but choice of license is also important
- Examples and documentation are not an optional

Thank you!

Questions ?

These slides are available at https://github.com/ilmanzo/suse_presentations/