Programming Languages (3) Going outside Jupyter and Using Libraries

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Objectives

- ▶ make programs outside Jupyter playground
 - ► SSH (command line)
 - editors, not web browsers
 - build system
- ▶ use libraries
- ▶ split a program into multiple files (\approx use something defined in another file)

Build system

many languages have "build system" to help you use external libraries

- ► Go: go is it
- ▶ Julia: no particular build system
- ► OCaml: dune https://dune.build/
- ► Rust : cargo

Using libraries

using a library entails different procedures depending on how "embedded" it is into the language

- ▶ some libraries are "builtin"
 - automatically available in every program
- ▶ some libraries are "standard"
 - > you need to master how to refer to names in it
 - you say "import" or "use" it and/or use prefixes to refer to names in it
 - ▶ installed with the language
- ▶ some libraries are "external"
 - you may have to install it
 - > you may have to tell the compiler where it is

Importing a library to your program

- lacktriangle assume M is a module name and n a name defined in M
- ► OCaml:
 - ightharpoonup call M.n
 - ightharpoonup open M and call n
- ► Julia :
 - ightharpoonup import M and call M.n
 - ightharpoonup using M and call n
- **Go:**
 - ightharpoonup import "M" and call M.n
- ► Rust :
 - ▶ a module may contain a module
 - \triangleright assume C is the name of a "crate"
 - ightharpoonup call $C::M_0::M_1::\cdots:n$
 - ightharpoonup use $C::M_0::M_1::\cdots::n$ and call n
 - anywhere between the two

Repository of libraries

- ▶ master how to get information you need (names of functions, their types, etc.) from those repositories
- ▶ is it builtin? standard? external?
- OCaml: opam https://opam.ocaml.org/
- Julia: Julia packages https://julialang.org/packages/
- ► Go: https://pkg.go.dev/
- Rust : https://crates.io/