

Polymorphism: hands-on

1) Implement a class `Character` containing the following:

- Data member: `float speed_`
- Data member: `float max_speed_`
- Default constructor: initializes `speed_` to 0 and `max_speed_` to 10
- Member function: `void Accelerate()` increments `speed_` by 1 (up to `max_speed_`)
- Member function: `void Break()` decrements `speed_` by 1 (down to 0)
- Inlined getter: `inline float speed() const`

Don't forget the destructor and the tests ;)

2) Add a pure virtual function member

Add the following declaration to your class `Character`: `virtual std::string WhatAml() const = 0;`

Explain what happens at compile-time

3) Extend class `Character`:

Implement classes `Mario` and `Yoshi` that specialize class `Character` and override `WhatAml()` :

- `Mario::WhatAml()` will return string "Mario"
- `Yoshi::WhatAml()` will return string "Yoshi"

4) Override function `Accelerate()`

It is well known that a fit lizard accelerates faster than a fat plumber does.

Override `Yoshi::Accelerate()` accordingly

5) Let the race begin

Populate an stl container of your choice with at least one Yoshi and one Mario and check that Yoshis do indeed accelerate faster (you will use both iterators and range-based for loops)

6) Number of crests

Each Yoshi can have a different number of crests.

Add a new data member to store this information. This member will be allocated manually.

`Yoshi::WhatAml()` will return a string of the form "X crested Yoshi" where X is the number of crests this Yoshi has

Check that you have no memory leaks

Hand-in

Make a bare clone of your gitlab repository named `<lastname>.git` (e.g. `parsons.git`): `git clone --bare <path>/.git <lastname>.git` .

Create an archive `polymorphism_<lastname>.tgz` (e.g. `polymorphism_parsons.tgz`) containing the bare clone, upload it to <https://filesender.renater.fr/> and send us the link (david.parsons@inria.fr and sebastien.valette@creatis.insa-lyon.fr).

Deadline: January 24, 2022 at the end of the lab.