With std::optional

The lesson shows why std::optional is the right choice for nullable types.

WE'LL COVER THE FOLLOWING

- How to Refactor using std::optional?
- What are the advantages of the optional version?

How to Refactor using std::optional?

From the `std::optional` chapter:

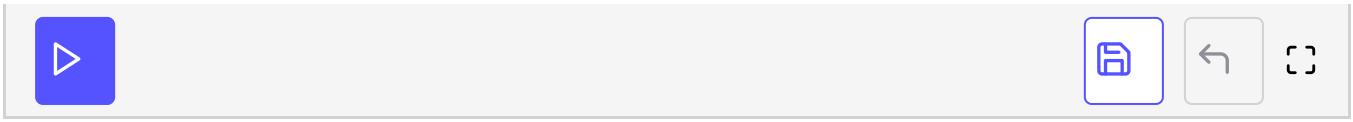
> `std::optional` is a wrapper type to express “null-able” types. It either contains a value, or it’s empty. It doesn’t use any extra memory allocation.

That seems to be the perfect choice for our code. We can remove the `ok` variable and rely on the semantics of the optional.

The new version of the code:

```
#include <iostream>
#include <tuple>
#include <optional>
#include <variant>
#include <vector>

class ObjSelection
{
  public:
  bool IsValid() const { return true; }
};

struct SelectionData
{
    bool anyCivilUnits { false };
    bool anyCombatUnits { false };
    int numAnimating { 0 };
```

```
};

std::optional<SelectionData> CheckSelectionVer4(const ObjSelection &objList)
{
  if (!objList.IsValid())
    return std::nullopt;

  SelectionData out;
  // scan...

  return out;
}

int main(){

  ObjSelection sel;

  bool anyCivilUnits = false;
  bool anyCombatUnits = false;
  int numAnimating = 0;
  //  for the caller site:

  if (auto ret = CheckSelectionVer4(sel); ret.has_value())
  {
    // access via *ret or even ret->
    std::cout << "ok..." << ret->numAnimating << '\n';

  }
}
```



What are the advantages of the optional version?

- **Clean and Expressive Form** - optional expresses nullable types.
- **Efficiency** - implementations of optional are not permitted to use additional storage, such as dynamic memory. The contained value shall be allocated in a region of the optional storage suitably aligned for the `type T`.

That's all for optional std, now its time to look into `std::variant` version.