

## Lambdas

## Chapter 2 Conditionally Safe Features

```

// push integer literal
long v = std::stol(token.c_str(), nullptr, 10);
nextInstr = [v](long* sp){ *sp++ = v; return sp; };
break;
}
case '+':
{
// + operation: pop 2 longs and push their sum
nextInstr = [](long* sp){
    long v1 = *--sp;
    long v2 = *--sp;
    *sp++ = v1 + v2;
    return sp;
};
break;
}
// ... more cases
}

instructionStream.push_back(nextInstr);
}

```

The `Instruction` type alias is an `std::function` that can hold, through a process called **type erasure**, any invocable object that takes a `long*` argument and returns a `long*` result. The `readInstructions` function reads successive string tokens and switches on the operation represented by the token. If the operation is `i`, then the token is an integer literal. The string token is converted into a `long` value, `v`, which is captured in a **lambda expression**. The resulting closure object is stored in the `nextInstr` variable; when called, it will push `v` onto the stack. Note that the `nextInstr` variable outlives the primary `v` variable, but, because `v` was **captured by copy**, the **captured variable's** lifetime is the same as the closure object's. If the next operation is `+`, `nextInstr` is set to the closure object of an entirely different **lambda expression**, one that captures nothing and whose call operator pops two values from the stack and pushes their sum back onto the stack.

After the **switch** statement, the current value of `nextInstr` is appended to the instruction stream. Note that, although each **closure type** is different, they all can be stored in an `Instruction` object because the prototype for their call operator matches the prototype specified in the instantiation of `std::function`. The `nextInstr` variable can be created empty, assigned from the value of a **lambda expression**, and then later reassigned from the value of a different **lambda expression**. This flexibility makes `std::function` and **lambda expressions** a potent combination.

One specific use of `std::function` worth noting is to return a **lambda expression** from a nontemplate function: