Example templates for code generation

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Labels

- Make unique labels by appending counters.
- Generally make labels first, since code is generated recursively.

If statements

if ⟨expression⟩ **then** ⟨statement1⟩ **else** ⟨statement2⟩

```
            code for ⟨expression⟩
            cmp "⟨expression⟩-result", "true"
            jne elsepart
            code for ⟨statement1⟩
            jump endif
    elsepart:
            code for ⟨statement2⟩
    endif:
```

While statements

while ⟨expression⟩ **do** ⟨statement⟩

```
    whilestart:
            code for ⟨expression⟩
            cmp "⟨expression⟩-result", "true"
            jne whileend
            code for ⟨statement⟩
            jump whilestart
    whileend:
```

New statements

new ⟨id-expression⟩ **of length** ⟨expression⟩

```
    code for ⟨expression⟩
    (code for out-of-memory check)
    move "heap-counter", "address of ⟨id-expression⟩"
    add the value of ⟨expression⟩ to heap-counter
```

Index expressions

⟨id-expression⟩ **[** ⟨expression⟩ **]**

```
    code for ⟨expression⟩
    (code for range checks)
    look up address of ⟨id-expression⟩
    compute final address
```

Addition expressions

⟨expression1⟩ + ⟨expression2⟩

```
    code for ⟨expression1⟩
    place result in temporary
    code for ⟨expression2⟩
    place result in temporary
    add temporaries
    place result in temporary
```

Function definitions

Code must be generated according to the stack frame convention. Make sure function labels are all produced in advance.

```
            code for local functions
    startfunc:
            code for variable declarations
            code for start-of-function
            code for function body
    endfunc:
            code for end-of-function
```

Return statements

return ⟨expression⟩

```
    code for ⟨expression⟩
    move "⟨expression⟩-result", %eax
    jump to label of end-of-function code
```