

## Script generated by TTT

Title: Petter: Compiler Construction (02.07.2020)  
- 60: Whole Programs

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## Translation of Whole Programs

A program  $P = F_1; \dots; F_n$  must have a single main function

```
code1 P ρ =
  loadc R1 _main
  mark
  call R1
  halt
  _f1 : code1 F1 ρ ⊕ ρf1
  ⋮
  _fn : code1 Fn ρ ⊕ ρfn
```

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Assumptions:

- $\rho = \emptyset$  assuming that we have no global variables
- $\rho_{f_i}$  contain the addresses of the functions up to  $f_i$
- $\rho_1 \oplus \rho_2 = \lambda x. \begin{cases} \rho_2(x) & \text{if } x \in \text{dom}(\rho_2) \\ \rho_1(x) & \text{otherwise} \end{cases}$

## Translation of the fac-function

Consider:

```
int fac(int x) {
  if (x<=0) then
    return 1;
  else
    return x*fac(x-1);
}
_fac: move R1 R-1 save param.
i = 2 move R2 R1 if (x<=0)
  loadc R3 0
  leq R2 R2 R3
  jumpz R2 _A to else
  loadc R2 1 return 1
  move R0 R2
  return
  jump _B code is dead
```

```
_A: move R2 R1 x*fac(x-1)
i = 3 loadc R3 _fac
i = 4 move R4 R1 x-1
i = 5 loadc R5 1
i = 6 sub R4 R4 R5
i = 5 move R-1 R4 fac(x-1)
i = 3 saveloc R1 R2
  mark
  call R3
  restoreloc R1 R2
  move R3 R0
i = 4 mul R2 R2 R3
i = 3 move R0 R2 return x*...
  return
_B: return
```