S3(4) - Locatii temporare

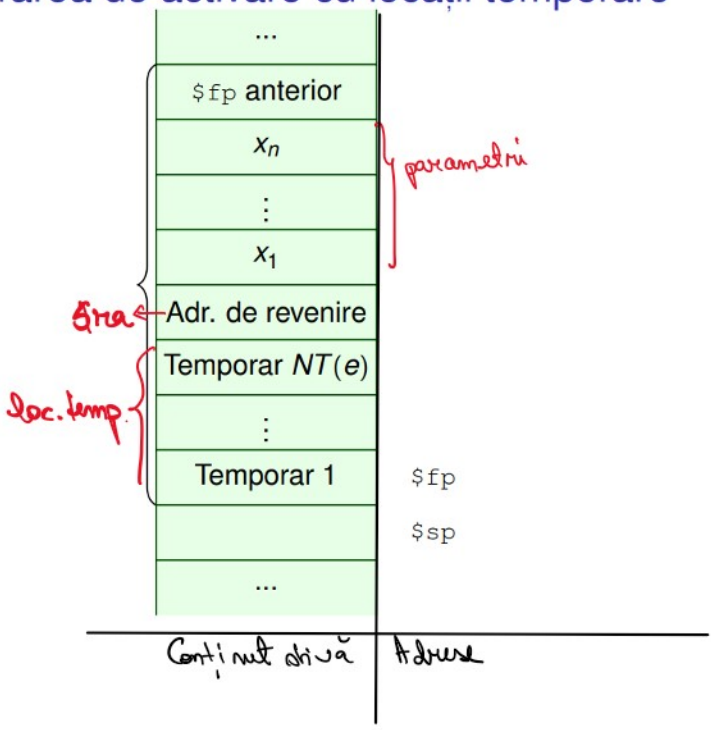
Tuesday, January 10, 2023 11:47 PM

LOCAȚII TEMPORARE + DIMENSIUNE ÎNREGISTRARE DE ACTIVARE (STACK FRAME)

Stabilirea anticipată a locațiilor temporare II

$$
\begin{aligned}
NT(1) &= 0 \\
NT(x) &= 0 \\
NT(e_1 + e_2) &= \max(NT(e_1), 1 + NT(e_2)) \\
NT(\textit{if } e_1 = e_2 \textit{ then } e_3 \textit{ else } e_4) &= \max(NT(e_1), 1 + NT(e_2), \\
&\qquad NT(e_3), NT(e_4)) \\
NT(f(e_1, \ldots, e_n)) &= \max(NT(e_1), \ldots, NT(e_n))
\end{aligned}
$$

Înregistrarea de activare cu locații temporare



EXERCIȚIU:

①

```
def f(x, y, z, w):
  if x = (y + z)
    then 5
  else if x = (if y = z then f(y, z, x, 1) else x)
    then x
  else x * (y + (z - x))
```

DIMENSIUNE:

2 reg (sfp, sra)

4 param

3 loc. temporare

⇒ (2+4+3) * 4 = 9 * 4 = 36 octeți

Dimensiune stack frame?

⇒ Calculăm NT:

- if ⇒ $NT = \max(NT(l_1), 1 + NT(l_2), NT(l_3), NT(l_4)) \Rightarrow 3$ (0, 2, 0, 3)

  $NT(l_1) = NT(x) = 0$

  $NT(l_2) = NT(y+z) = \max(NT(y), 1 + NT(z)) = \max(0, 1+0) = 1$

  $NT(l_3) = NT(5) = 0$

  $NT(l_4) = NT(\text{if} \dots)$

- if ⇒ $NT = \max(NT(l_1'), 1 + NT(l_2'), NT(l_3'), NT(l_4'))$ (0, 1, 0)

  $NT(l_1') = NT(x) = 0$

  $NT(l_2') = NT(\text{if} \dots) = \max(NT(l_1''), 1 + NT(l_2''), NT(l_3''), NT(l_4'')) = 1$ (0, 1, 0, 0)

  - if $NT(l_1'') = NT(y) = 0$

    $NT(l_2'') = NT(z) = 0$

    $NT(l_3'') = NT(f(y, z, x, 1)) = \max(NT(y), NT(z), NT(x), NT(1)) = 0$ (0, 0, 0, 0)

    $NT(l_4'') = NT(x) = 0$

  $NT(l_3') = NT(x) = 0$

  $NT(l_4') = NT(x * (y + (z - x)))$

  $= \max(NT(x), 1 + NT(y + (z - x)))$

  $= \max(0, 1 + \max(NT(y), 1 + NT(z - x)))$

  $= \max(0, 1 + \max(0, 1 + \max(NT(z), 1 + NT(x))))$

  $= \max(0, 1 + \max(0, 1 + \max(0, 1)))$

  $= \max(0, 1 + \max(0, 1 + 1))$

  $= \max(0, 1 + 2) = 3$

(2)

```
1  f(x, y, z) {                                  l3
2      if x = y + 1 then {g(x, y + 1, z)}
3          l1      l2    else {h(x + 1, y + 1)} }
                                  l4
```

$l_1 \to 0$

$l_2 \to 1$

$l_3 \to g(x^{0}, y+1^{1}, z^{0}) = 1$

$l_4 \to h(x+1^{1}, y+1^{1}) = 1$

$NT(l) = \max(NT(l_1), 1 + NT(l_2), NT(l_3), NT(l_4)) = 2$

$\downarrow 0 \quad \downarrow 2 \quad \downarrow 1 \quad \downarrow 1$

(3)

$E_1 = l_1 + l_2 + l_3 + l_4 + l_5$

$E_2 = l_1 + (l_2 + (l_3 + (l_4 + l_5)))$

$NT(E_1) \;?\; NT(E_2)$

(a) dacă sunt literali $\Rightarrow E_1 \to \max 1$

$E_2 \to \max 4$

(expr. se oval prima dată la $l_4 + l_5$ $\Rightarrow$ până acolo se fac loc. temp. pt restul lit. $\Rightarrow l_1 \dots l_4 = 4$)

(=) $E_1 \to (l_1 + l_2) \to \max(NT(l_1), 1 + NT(l_2))$ *

$l_1 + l_2 + l_3 \to \max(*, 1 + NT(l_3))$ **

$l_1 + l_2 + l_3 + l_4 \to \max(**, 1 + NT(l_4))$ ***

$l_1 + l_2 + l_3 + l_4 + l_5 \to \max(***, 1 + NT(l_5))$

$\to \max(NT(l_1), 1 + NT(l_2), 1 + NT(l_3), 1 + NT(l_4), 1 + NT(l_5))$

$E_2 \to (l_4 + l_5) \to \max(NT(l_4), 1 + NT(l_5))$

$l_3 + (l_4 + l_5) \to \max(NT(l_3), 1 + *)$ **

$l_2 + (l_3 + (l_4 + l_5)) \to \max(NT(l_2), 1 + **)$ ***

$l_1 + (l_2 + (l_3 + (l_4 + l_5))) \to \max(NT(l_1), 1 + ***)$

$\to \max(NT(l_1), 1 + NT(l_2), 2 + NT(l_3), 3 + NT(l_4), 4 + NT(l_5))$

$\Rightarrow$ atunci când $NT(l_1) = \max$

(*) $\Rightarrow \max(NT(l_3), 1 + \max(NT(l_4), 1 + NT(l_5))) =$ (um pas calculat pt E_2)

$\max(NT(l_3), \max(1 + NT(l_4), 2 + NT(l_5))) =$

$\max(NT(l_3), 1 + NT(l_4), 2 + NT(l_5)) \dots$

(>) niciodată