Extra week with my SASC accomodation

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CS 320
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1.1 SDT

$E \rightarrow E + T \mid E == T \mid T$

$T \rightarrow E \mid integer \mid string$

$E \rightarrow E_1 + T$

```
if(E1.type == int && T.type == int)
    E.type = INT;
if(E1.type == Str && T.type != Error)
    E.type = STR;
else
    E.type = ERROR;
```

* $E \rightarrow E_1 == T$

```
if(E1.type == T.type && T.type != Error)
    E.type = BOOL
else
    E.type = ERROR
```

$E \rightarrow T$

```
E.type = T.type
```

$T \rightarrow E$

```
T.type = E.type
```

$T \rightarrow integer$

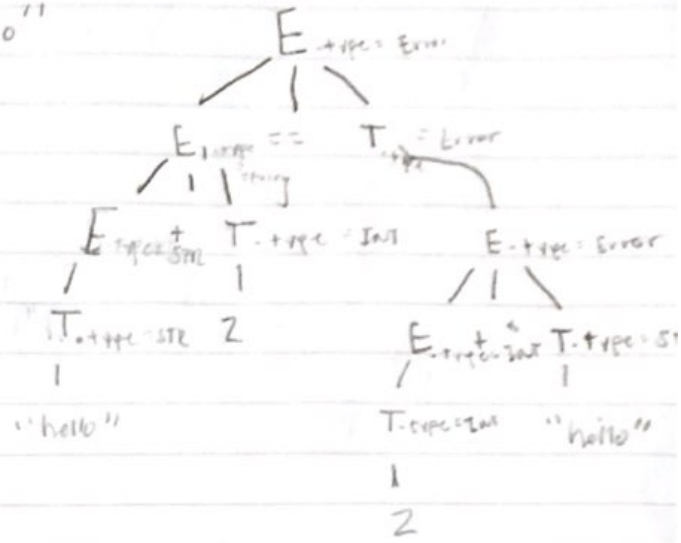
```
T.type = INT
```

$T \rightarrow string$

```
T.type = STR
```

1.2 "hello" + 2 == 2 + "hello"

$E_1$ == T




2.1 Global

| | | |
|---|---|---|
| X | var | int |
| C | func | p → void |
| D | func | void → void |
| B | func | void → void |

* Plus a function

C

| | | |
|---|---|---|
| X | var | int |
| P | param | fun |

D

N/A

B

| | | |
|---|---|---|
| X | var | int |

2.2

Reference environment:

Variables: X

Parameters: None / NULL

Procedures: C, D, B

2.3

Shallow binding

6

top: Binds when actually called

*

2.4

Deep binding

3

* Binds when procedures passed as arg

3. 3.1 Static Scoping

| | |
|---|---|
| 1 | 100 |
| 2 | 50 |
| 3 | 1 |
| 4 | 100 |
| 5 | 100 |

Follow Declaration outside of func with param. Func which calls another fun ↳ 06 var

3.2 Dynamic Scoping

| | |
|---|---|
| 1 | 100 |
| 2 | 50 |
| 3 | 1 |
| 4 | 1 |
| 5 | 100 |

Func can change variables within func

* Before these numbers
1 " in main program -- n = "
2 " in laurel -- n = "
3 " in laurel -- n = "
4 " in hardy -- n = "
5 " in hardy -- n = "

0 1 2
(5, 2, 4)

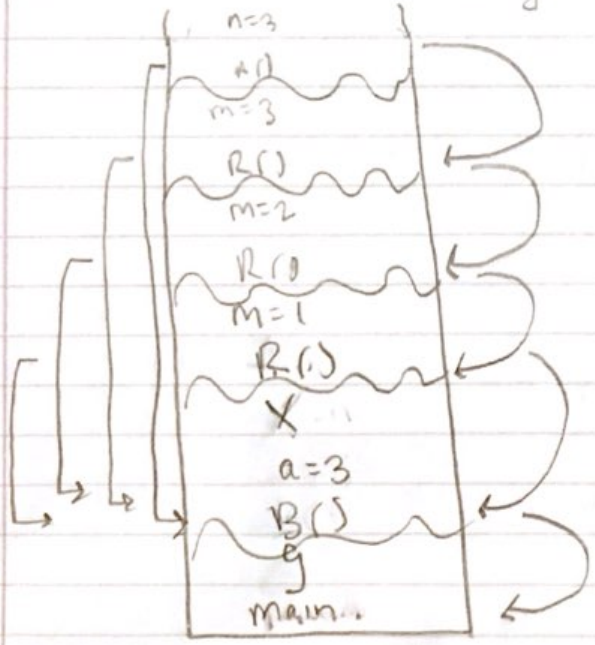
* 4. 4.1 Pass-by-value: (5, 2, 4)
4.2 Pass-by-reference: (5, 4, 2)
4.3 Pass-by-value-result: (5, 4, 2)

Same variable → 2 different

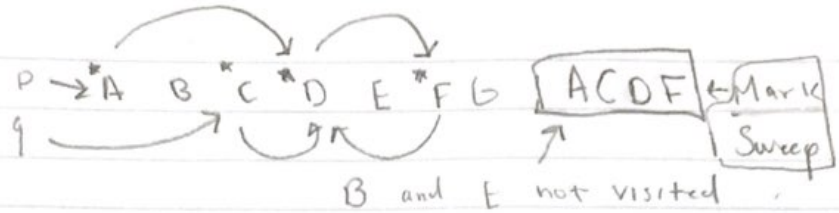
Pass-by-val creates a copy
Pass-by-ref directly changes

main

5.




X
a=3
B
g
main

6.1 

*each node visited by

6.2 ADFC | Mark
A B C D E F | Sweep > Mark and Sweep — Mark variables visited then visit all variables checking if there marked

A B C D E F | AD'FC — Stop-and-copy — start pointing at - then pointing... copy each to new heap

7-1 ~~{(x,6),(y,-3)} - {(x,6),(y,-3)} ∪ {(w,1)}~~

$(S_1 - (S_1 \lambda S_3)) \cup S_3$

$S_1 = \{(x,6),(y,-3)\}$
$S_3 = \{(w,-1)\}$

$(S_1 - \emptyset) \cup S_3$
$S_1 \cup S_3$
$S_1 - (S_1 \lambda S_3)$ → $\emptyset$

$S_1$ $S_2$
$\{(x,6),(y,-3),(w,1)\}$

7-2 ~~$\phi\psi$~~ $S_1 \cup S_2 \lambda S_3$ → $S_1 \cup S_2 \lambda S_3$

$\{(x,-2),(y,-5),(z,75)\} \lambda S_3$

$\emptyset$