

CS480

Compilers

Semantic Actions One

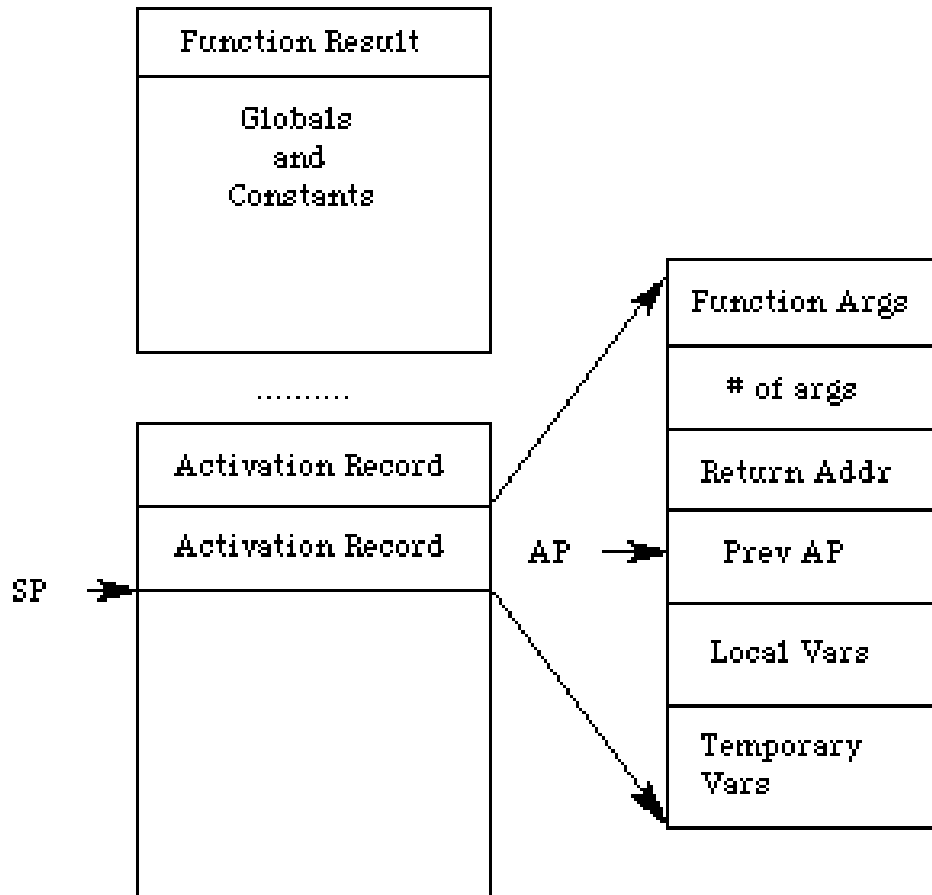
March 15, 2013

Less Code, More Design

Design

- Manage attributes
 - synthesized/inherited
- Quad File Generation
 - back patch
 - look at upcoming Quads
- Semantic Error Checking
 - how/where/when

Activation Record



```
int b(c,d)
int c,d;
{
    int h,i;
}
```

```
main()
{
    int f;
    int g[5];
}
```

Quads

OpCode	Instruction	Operands			Functionality
20	load parameter	op1			push op1 on runtime stack
21	function call	op1		label	op1 = # of parameters already pushed push op1 push PC push AP AP <- SP PC <- label
22	function begin	op1			op1 = size of local data area SP = SP + op1
23	function return				pop activation record off stack and update AP, SP, and PC. Also, put function result in location 0.

Source to Quad

```

int a;

int b(c,d)
int c,d;
{
    int h,i;
}

int e()
{
}

main()
{
    int f;
    int g[5];
}

```

Quad File

```

-----
1 27 0      0 0      0 0      0
2 22 0      2 0      0 0      0
2 23 0      0 0      0 0      0
2 22 0      0 0      0 0      0
2 23 0      0 0      0 0      0
2 22 0      7 0      0 0      0
2 23 0      0 0      0 0      0
1 28 0      0 0      0 0      0
3
0
0
5

```

Runtime Stack

0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Symbol Table

```
int a;  
  
int b(c,d)  
int c,d;  
{  
    int h,i;  
}
```

Deleting a level - ST before leaving function b:

SYMBOL TABLE				
Identifier	Level	Type	Address	Other
a	1	1	1	-1
b	1	5	1	2
c	2	1	-3	-1
d	2	1	-4	-1
else	0	0	4	-1
for	0	0	6	-1
h	2	1	1	-1
i	2	1	2	-1
if	0	0	3	-1
input	0	0	7	-1
int	0	0	2	-1
main	0	0	1	-1
output	0	0	8	-1
return	0	0	5	-1