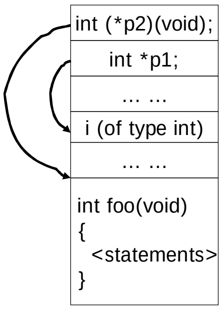
Function Pointer

Stanley Yao
Computer Science Department
University of Arizona

Function

- A group of statements
- Starts from a certain address
- Function name itself is a pointer pointing to the start address of the function
- A function name contains many information
  - Point to the starting address of then function
  - Function pointer base type
    - Parameter type list
    - Return value type

Function, Variable and Pointer



int (*p2)(void);

int *p1;

… …

i (of type int)

… …

```
int foo(void)
{
  <statements>
}
```

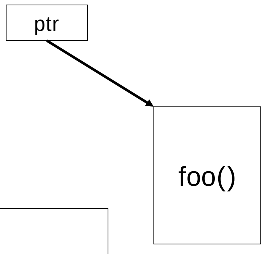
Function Pointer

```
int (*func)(int foo);
```

- func: a function pointer
- “func” points to a function that takes an int as parameter and returns int
- The base type of “func” is a function that takes an int and returns an int
- Compare: `int *func(int foo);`

Using Function Pointers

```
void foo (void) {
        printf(“hello\n”);
}
void main (void) {
    void (*ptr)(void);
    ptr = foo;
    (*ptr)(); // foo();
}
```

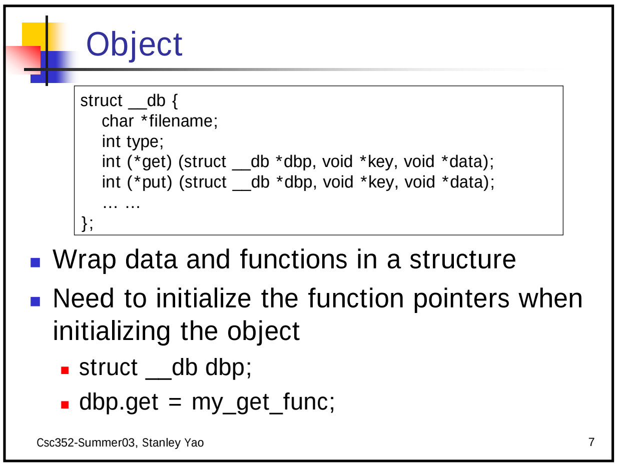


ptr: a function pointer
*ptr: the function to which “ptr” points to
(*ptr)(): a call to the function

qsort

```
void qsort(void *base, size_t nel, size_t width,
                int (*compar) (void *, void *));
```

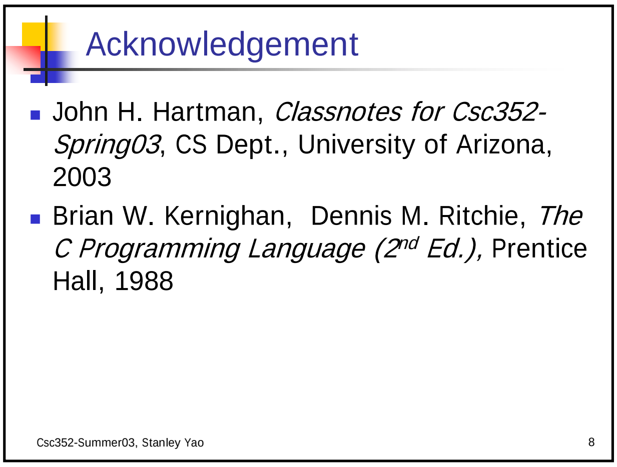
- qsort() routine in the C library
- The data items to be sorted can be of any type and size. How does qsort compare them during the sorting?
- base: address of the arrary of elements to be sorted
- nel: number of elements in the array
- width: size (in bytes) of each element
- compar: pointer to the compare function



Object

```
struct __db {
    char *filename;
    int type;
    int (*get) (struct __db *dbp, void *key, void *data);
    int (*put) (struct __db *dbp, void *key, void *data);
    … …
};
```

- Wrap data and functions in a structure
- Need to initialize the function pointers when initializing the object
  - struct __db dbp;
  - dbp.get = my_get_func;



Acknowledgement

- John H. Hartman, *Classnotes for Csc352-Spring03*, CS Dept., University of Arizona, 2003
- Brian W. Kernighan, Dennis M. Ritchie, *The C Programming Language (2nd Ed.),* Prentice Hall, 1988