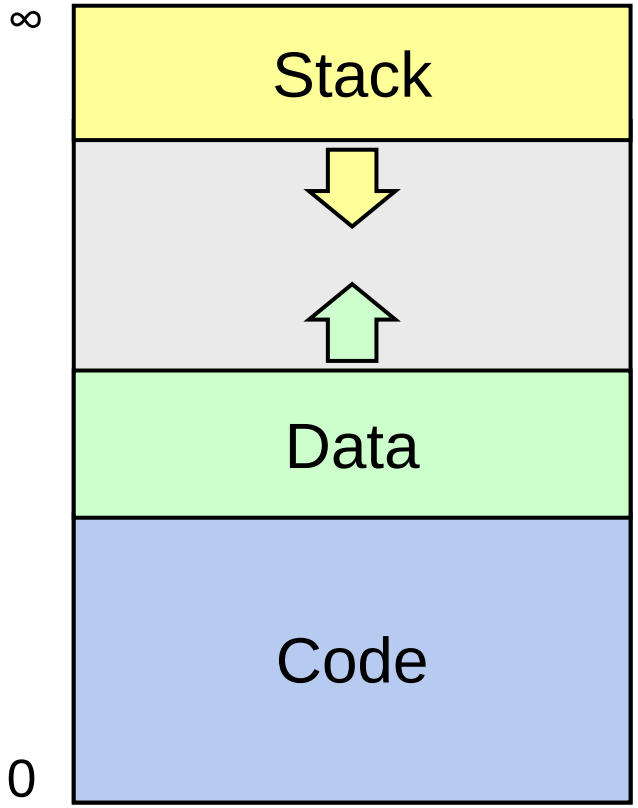
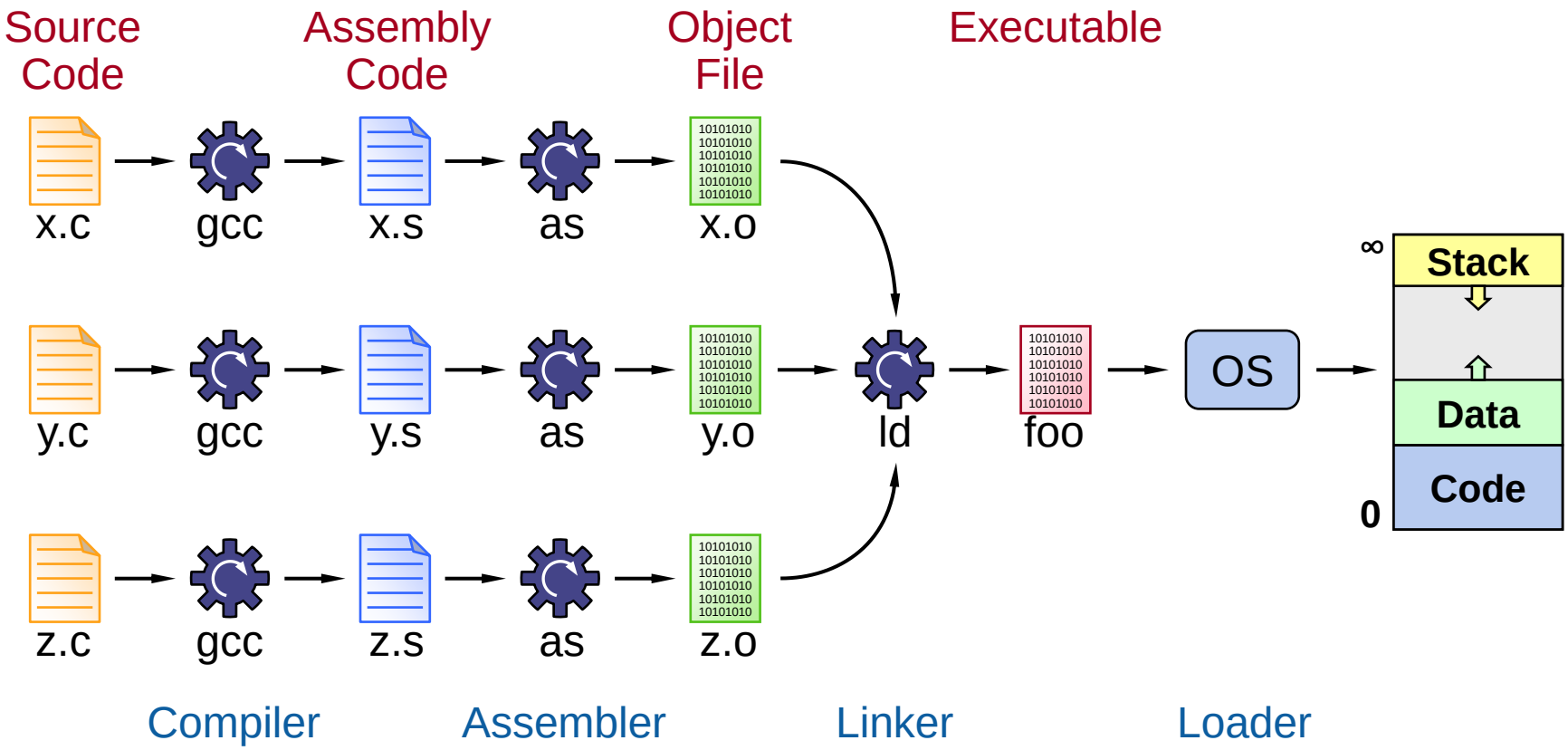
Memory Layout for Process



Creating a Process



A Simple Example

main.c

```
extern float sin();
extern printf(), scanf();

main() {
  double x, result;
  printf("Type number: ");
  scanf("%f", &x);
  result = sin(x);
  printf("Sine is %f\n",
         result);
}
```

stdio.c

```
FILE* stdin, stdout;

int printf(const char* format,...) {
  ...
  fputc(c, stdout);
  ...
}

int scanf(const char* format,...) {
  ...
  c = fgetc(stdin);
  ...
}
```

math.c

```
double sin(double x) {
  ...
}
```

main.o Object File

main.c

```
extern float sin();
extern printf(), scanf();

main() {
  double x, result;
  printf("Type number: ");
  scanf("%f", &x);
  result = sin(x);
  printf("Sine is %f\n",
         result);
}
```

main.o

```
 0  main:                          text section
    ...
30  call printf
    ...
52  call scanf
    ...
60  call sin
    ...
86  call printf

 0  _s1: "Type number: "           data section
14  _s2: "%f"
17  _s3: "Sine is %f\n"

    main    T[0]                   symbols
    _s1     D[0]
    _s2     D[14]
    _s3     D[17]

    printf  T[30]                  unresolved
    printf  T[86]                  references
    scanf   T[52]
    sin     T[60]
    _s1     T[24]
    _s2     T[54]
    _s3     T[80]
```

"Store the final location of sin at offset 60 in the text section"

stdio.o Object File

stdio.c

```
FILE* stdin, stdout;

int printf(const char* format,
    ...) {
  ...
  fputc(c, stdout);
  ...
}

int scanf(const char* format,
    ...) {
  ...
  c = fgetc(stdin);
  ...
}
```

stdio.o

text section

```
...
44  printf:
...
118 load stdout
...
232 scanf:
...
306 load stdin
...
```

data section

```
0   stdin:
8   stdout:
```

symbols

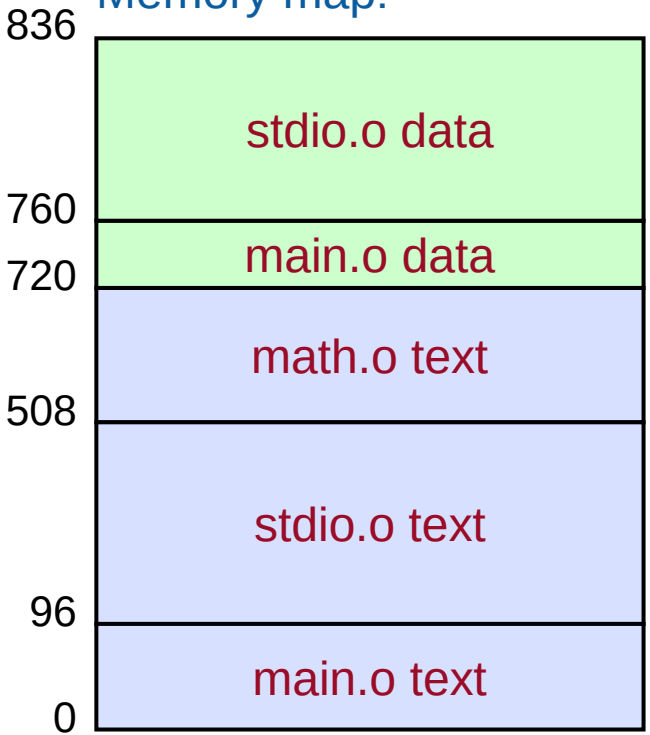
```
printf    T[44]
scanf     T[232]
stdin     D[0]
stdout    D[8]
```

unresolved references

```
stdout    T[118]
fputc     T[122]
stdin     T[306]
fgetc     T[310]
```

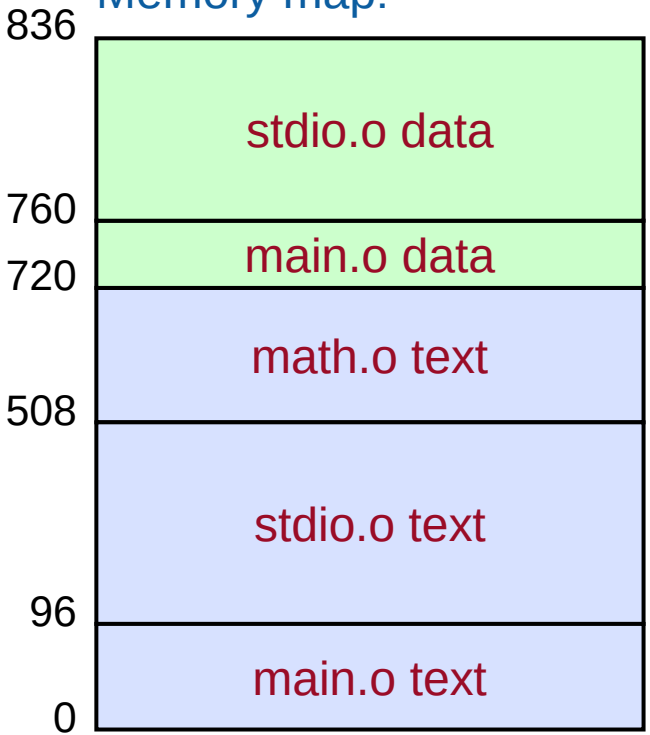
After Pass 1

Memory map:



After Pass 2

Memory map:



Symbol table:

Name	File	Sec	Offset	Addr
main	main.o	T	0	0
_s1	main.o	D	0	720
_s2	main.o	D	14	734
_s3	main.o	D	17	737
printf	stdio.o	T	44	140
scanf	stdio.o	T	232	328
stdin	stdio.o	D	0	760
stdout	stdio.o	D	8	768
sin	math.o	T	0	508

Resolving References