

Statically-linked libraries vs dynamically-linked libraries

Statically-linked libraries and dynamically linked libraries start with the same sections; init and plt. Then the static-linked libraries list down all the functions with their respective assembly code. This makes the whole file a lot bigger with 1778 lines of code. On the other hand, dynamically-linked libraries just link the libraries to the code; thus, making it much smaller in size with 401 lines of code.

Analysis with example

To understand the difference let's consider a function "imgblur".

The statically linked library compiled executable has the complete code of the function itself.

```
00000000000001dac <imgblur>:
```

1dac:	f3 0f 1e fa	endbr64
1db0:	55	push %rbp
1db1:	48 89 e5	mov %rsp,%rbp
1db4:	48 83 ec 10	sub \$0x10,%rsp
1db8:	48 89 7d f8	mov %rdi,-0x8(%rbp)
1dbc:	48 8b 45 f8	mov -0x8(%rbp),%rax
1dc0:	48 8b 00	mov (%rax),%rax
1dc3:	48 89 c7	mov %rax,%rdi
1dc6:	e8 64 fb ff ff	callq 192f <blur>
1dcb:	48 8b 45 f8	mov -0x8(%rbp),%rax
1dcf:	48 8b 40 08	mov 0x8(%rax),%rax
1dd3:	48 89 c7	mov %rax,%rdi
1dd6:	e8 54 fb ff ff	callq 192f <blur>
1ddb:	48 8b 45 f8	mov -0x8(%rbp),%rax
1ddf:	48 8b 40 10	mov 0x10(%rax),%rax
1de3:	48 89 c7	mov %rax,%rdi
1de6:	e8 44 fb ff ff	callq 192f <blur>
1deb:	90	nop
1dec:	c9	leaveq
1ded:	c3	retq

The dynamically-linked library compiled executable has the following set of instructions with different values for every function in the library.

```
0000000000001120 <imgblur@plt>:
1120:  f3 0f 1e fa          endbr64
1124:  f2 ff 25 5d 2e 00 00  bnd jmpq *0x2e5d(%rip)      # 3f88 <imgblur>
112b:  0f 1f 44 00 00       nopl  0x0(%rax,%rax,1)
```

1. endbr64
2. bnd jmpq
3. nopl

Domain	<i>Major differences</i>	
	Static	Dynamic
<i>Linking of Libraries</i>	Done by linker	Done by OS
Size	Much bigger because all the functions are written in the exe	Much smaller as it links to the libraries
Change in Libraries	The compilation should be done again	No compilation required.
Compatibility Issue	No compatibility issues as all the libraries are in the exe itself	The exe depends on the library and if it is removed then the exe will not work.

[Statically-Linked](#)

[Dynamically-Linked](#)