

PIC/PIE - Position Independent Code/Executables

- **Without PIC/PIE**

code is compiled with absolute addresses and must be loaded at a specific location to function correctly

- **With PIC/PIE**

code is compiled with relative addressing that are resolved dynamically when executed by calling a function to obtain the return value on stack

Confined execution environment - Sandbox

A sandbox is tightly-controlled set of resources for untrusted programs to run in

- ➔ Sandboxing servers - virtual machines
- ➔ Sandboxing programs
 - Chroot and AppArmor in Linux
 - Sandbox in MacOS Lion
 - Metro App Sandboxing in Windows 8
- ➔ Sandboxing applets - Java and Flash in web browsers