Project 2

Zen and the art of sending signals

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  2. What should this context consist of?

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- *esp* points at the end of the stack (stack grows down from higher to lower address)

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set up the *kernel* stack to look as if the thread had previously been running and then context-switched to the ready queue.

Background – Context Information

User Stack Location	Stack Data Selector (data selector)
	Stack Pointer (end of data memory)
Interrupt_State	Eflags
	Text Selector (code selector)
	Program Counter (entry addr)
	Error Code (0)
	Interrupt Number (0)
	EAX (0)
	EBX (0)
	ECX (0)
	EDX (0)
	ESI (Argument Block address)
	EDI (0)
	EBP (0)
	DS (data selector)
	ES (data selector)
	FS (data selector)
	GS (data selector)

The items at the top are pushed first.

Program Counter →EIP

User stack pointer points to the end of the DS.

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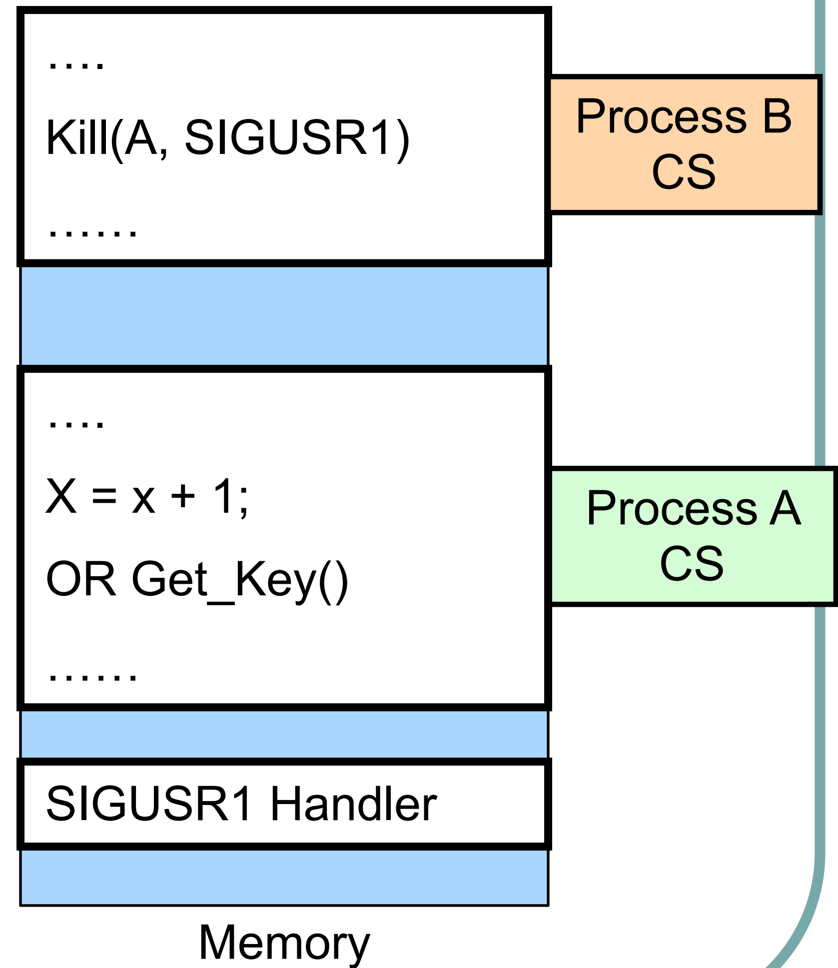
- Signals are to user processes what interrupts are to the kernel .
- Process temporarily stops what it is doing, and is instead redirected to the signal handler.
- When the handler completes, the process goes back to what it was doing (unless another signal is pending!)

Signals

1. Process A is executing then either finishes quantum OR blocked



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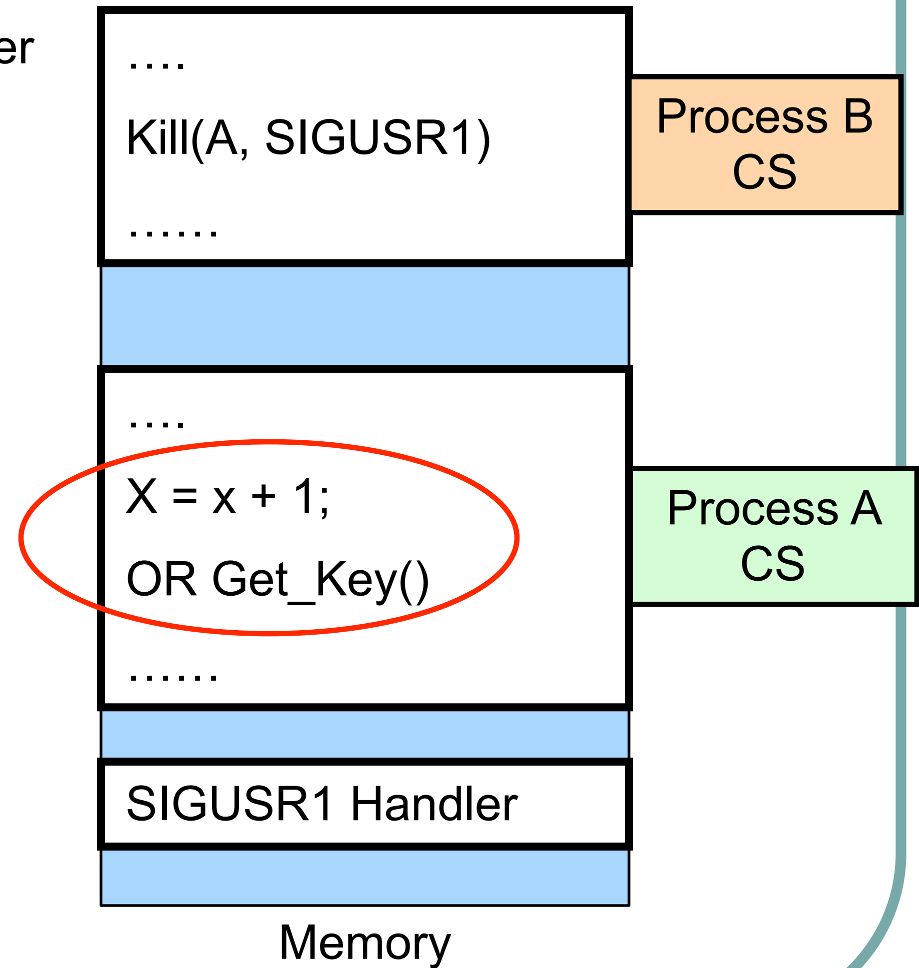

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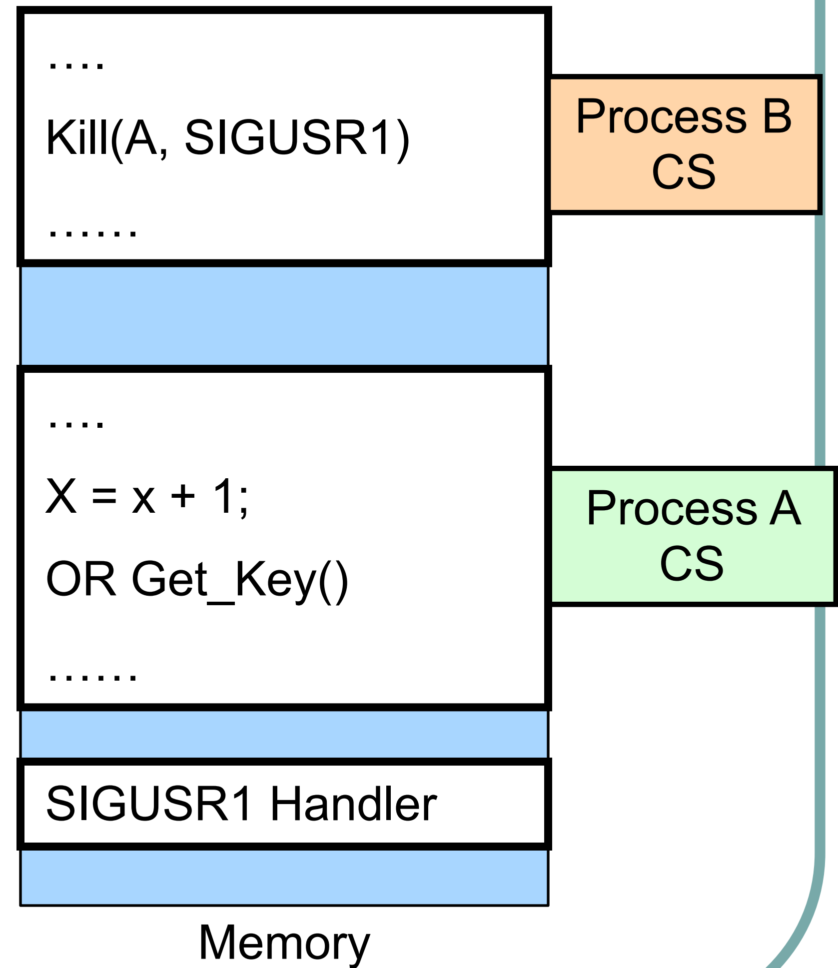

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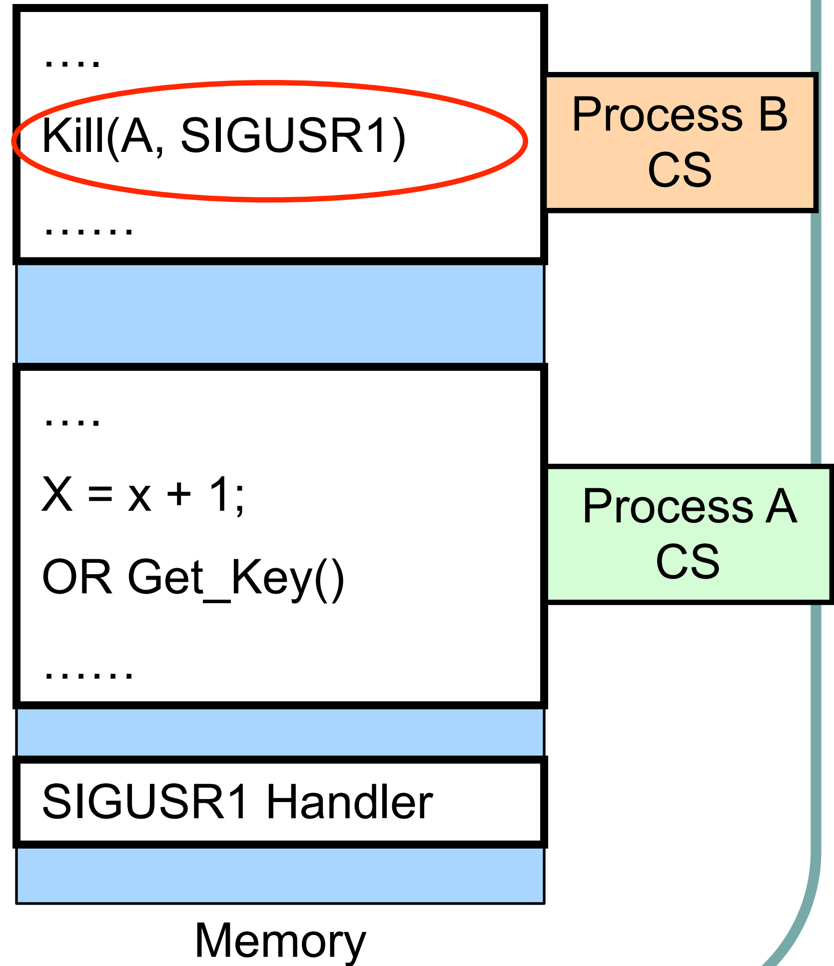

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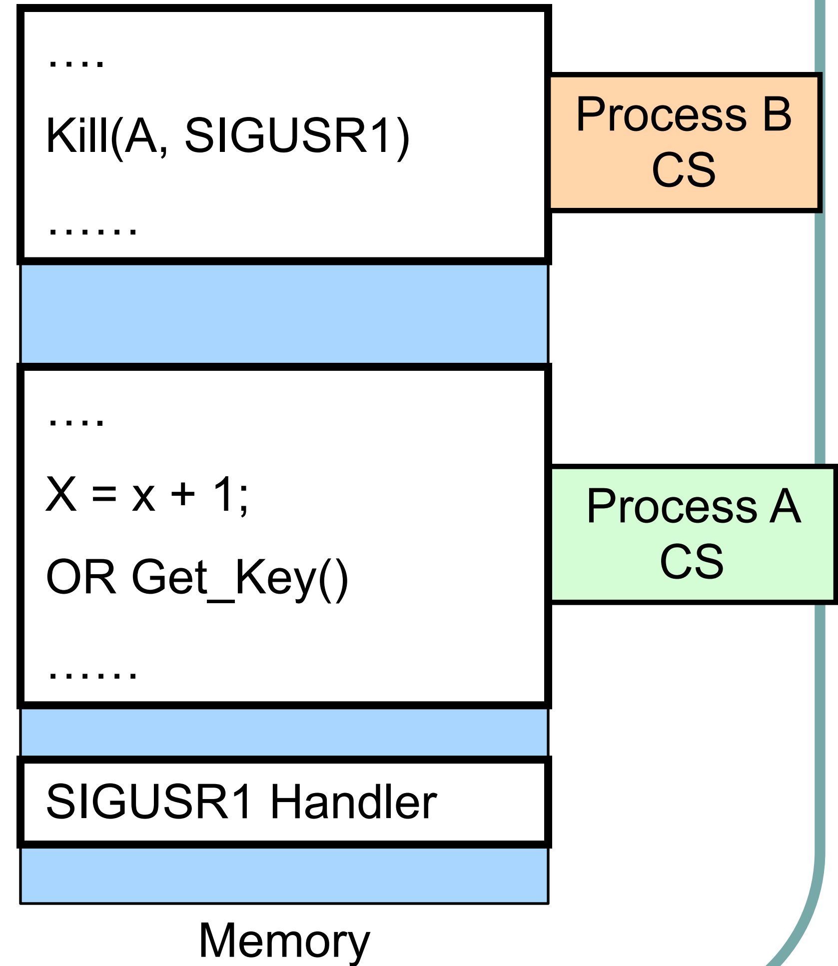

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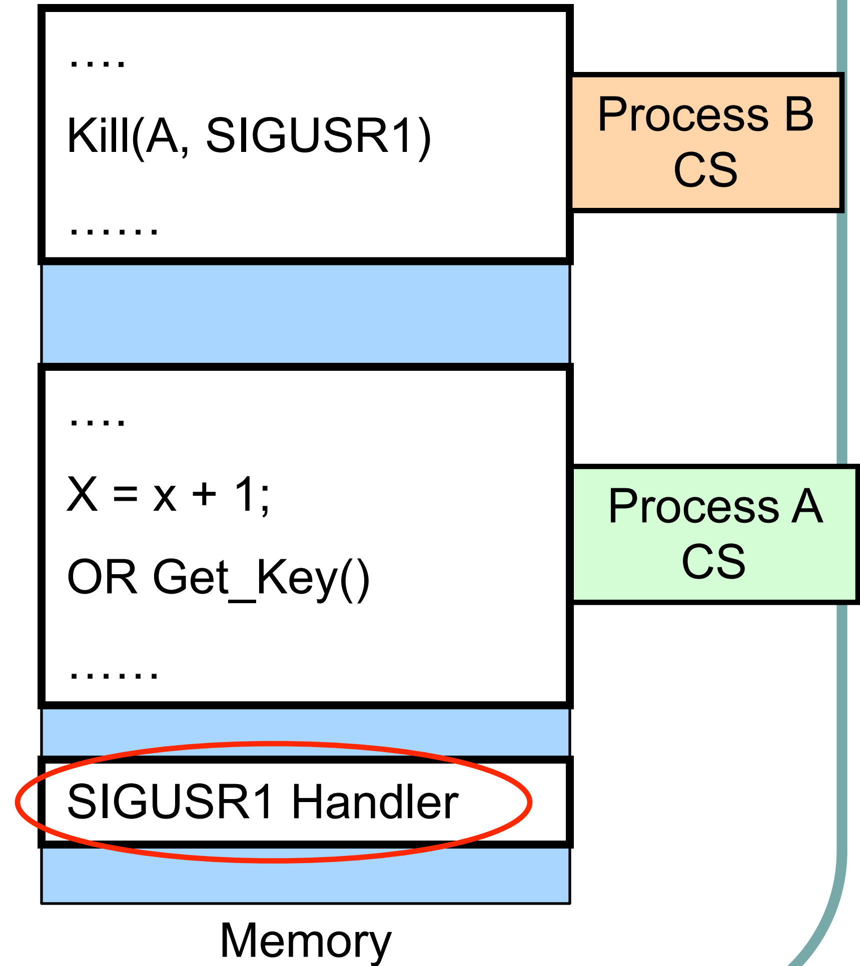

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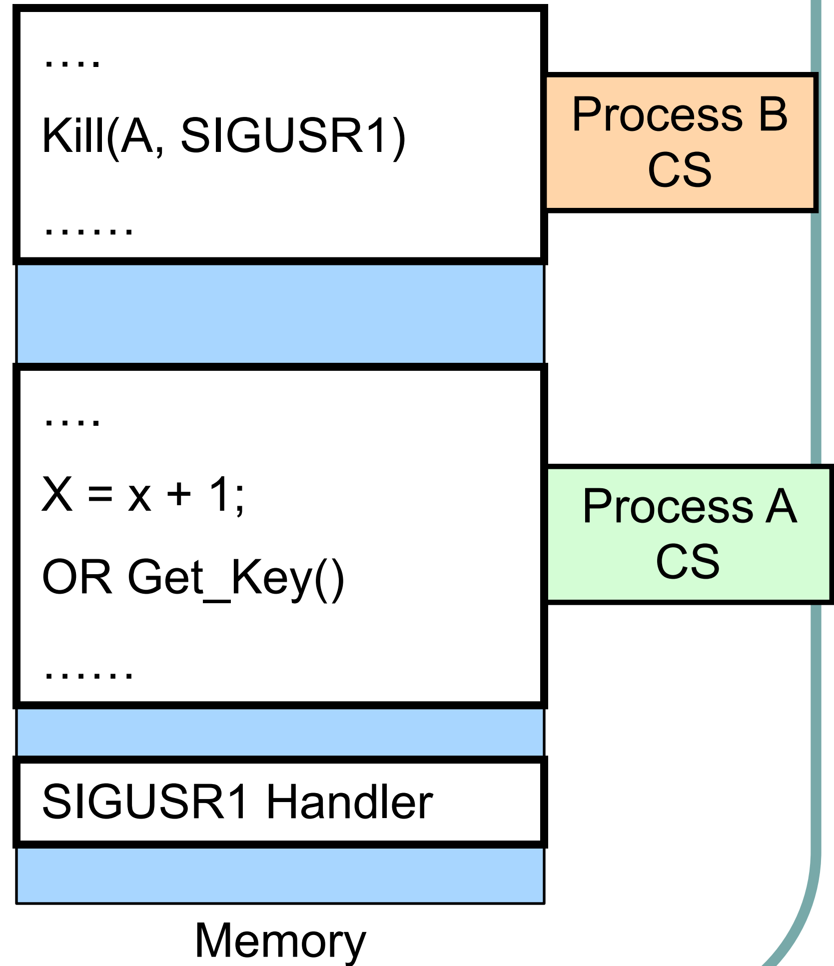

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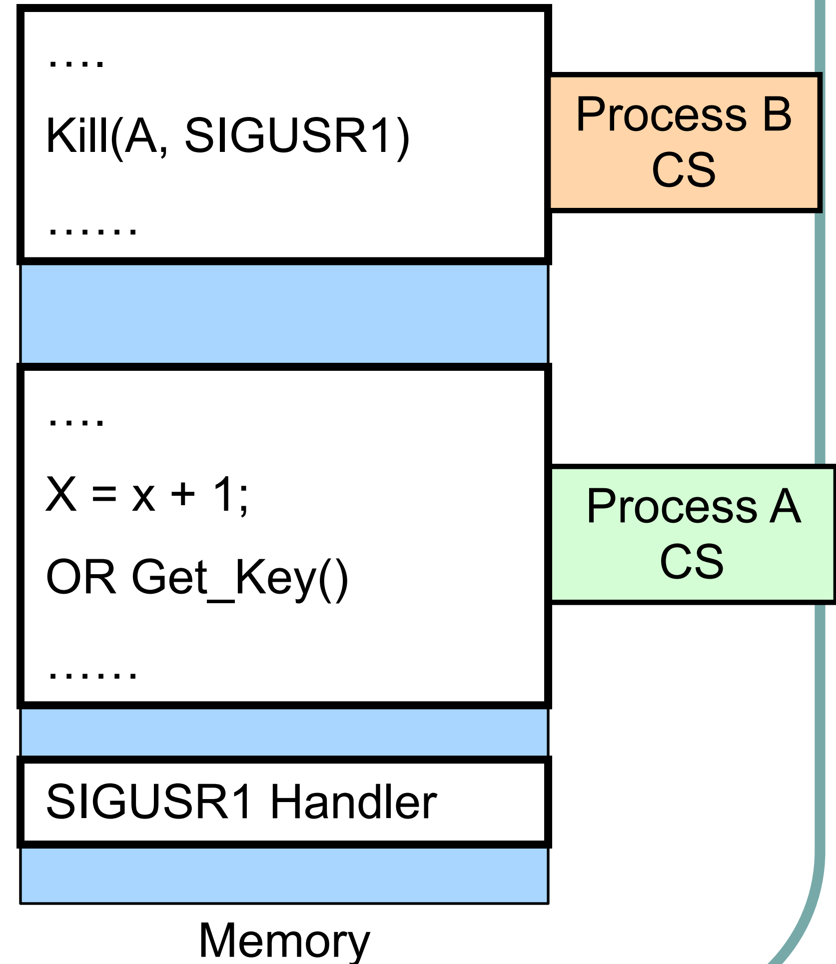
4. SIGUSR1 handler finishes. Then control transfers to Process A again (if no other signal pending).



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Look for TODO macro

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- SIGUSR1 & SIGUSR2
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- Default handler - reap the child

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- Sys_Kill: send a signal
- Sys_ReturnSignal: indicate completion of signal handler
- Sys_WaitNoPID: wait for any child process to die

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- Calling Sys_Signal with a handler to SIGKILL should result in an error.

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- Example: Signal(SIGUSR1,SIG_IGN);

Sys_ RegDeliver

- Register three functions:
  1. Ignore
  2. Default
  3. Return_Signal trampoline (calls Sys_ReturnSignal)
- Signals cannot be delivered until this is registered.
  - state->ebx - pointer to Return_Signal function
  - state->ecx - pointer to the default handler
  - state->edx - pointer to the ignore handler
  - Returns: 0 on success or error code (< 0) on error
- These routines are registered automatically. (check src/libc/entry.c)

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- Called by a process immediately after it has handled a signal.

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- Any process also stores THREE pointers to the Ign_Handler, Def_Handler, Signal_Return
- If there no handler registered, the default handler will be executed.
- Signal handling is non-reentrant.

Signals Delivery in Kernel

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- Send_Signal

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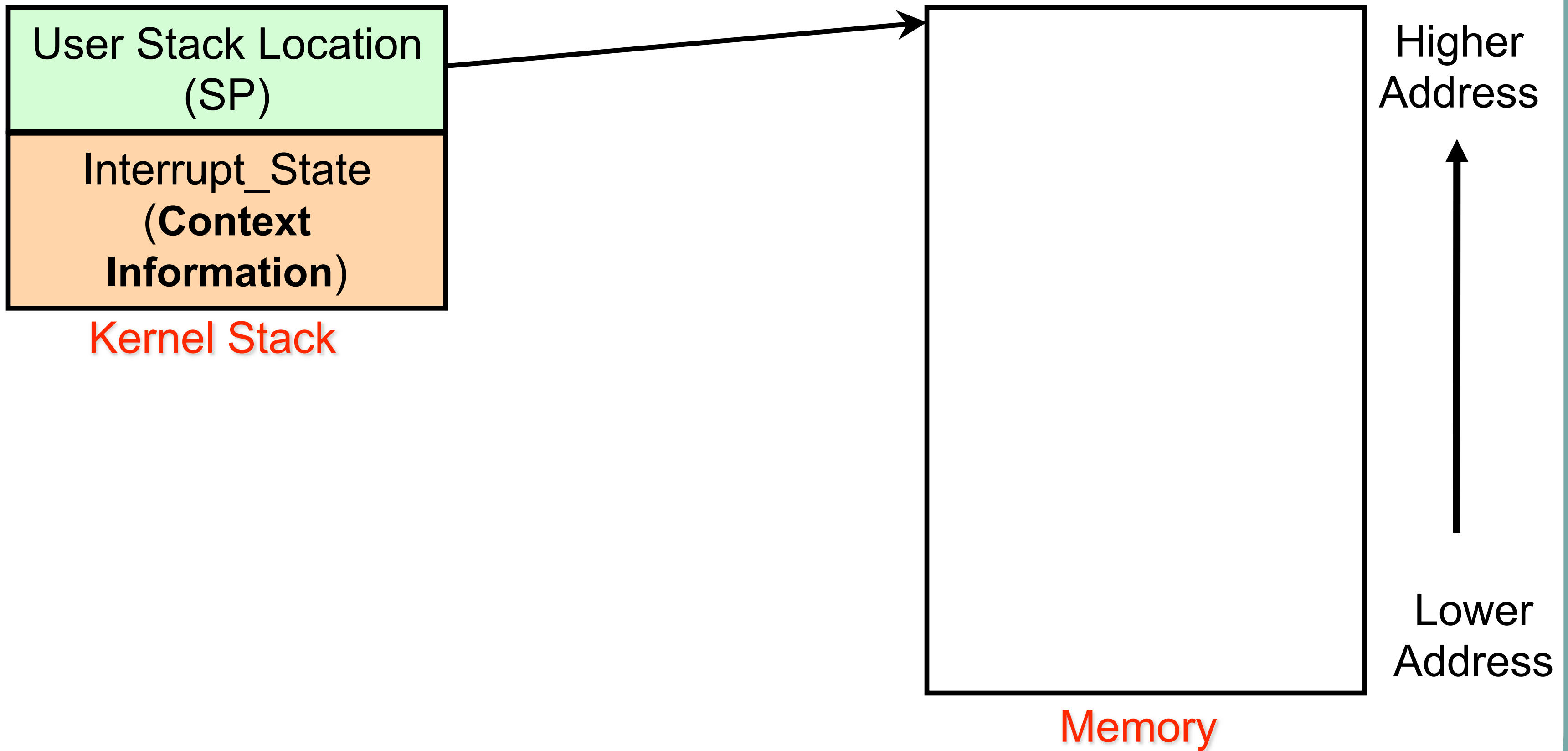
- (see include/geekos/defs.h)
- The process is not currently handling another signal.

Setup_Frame



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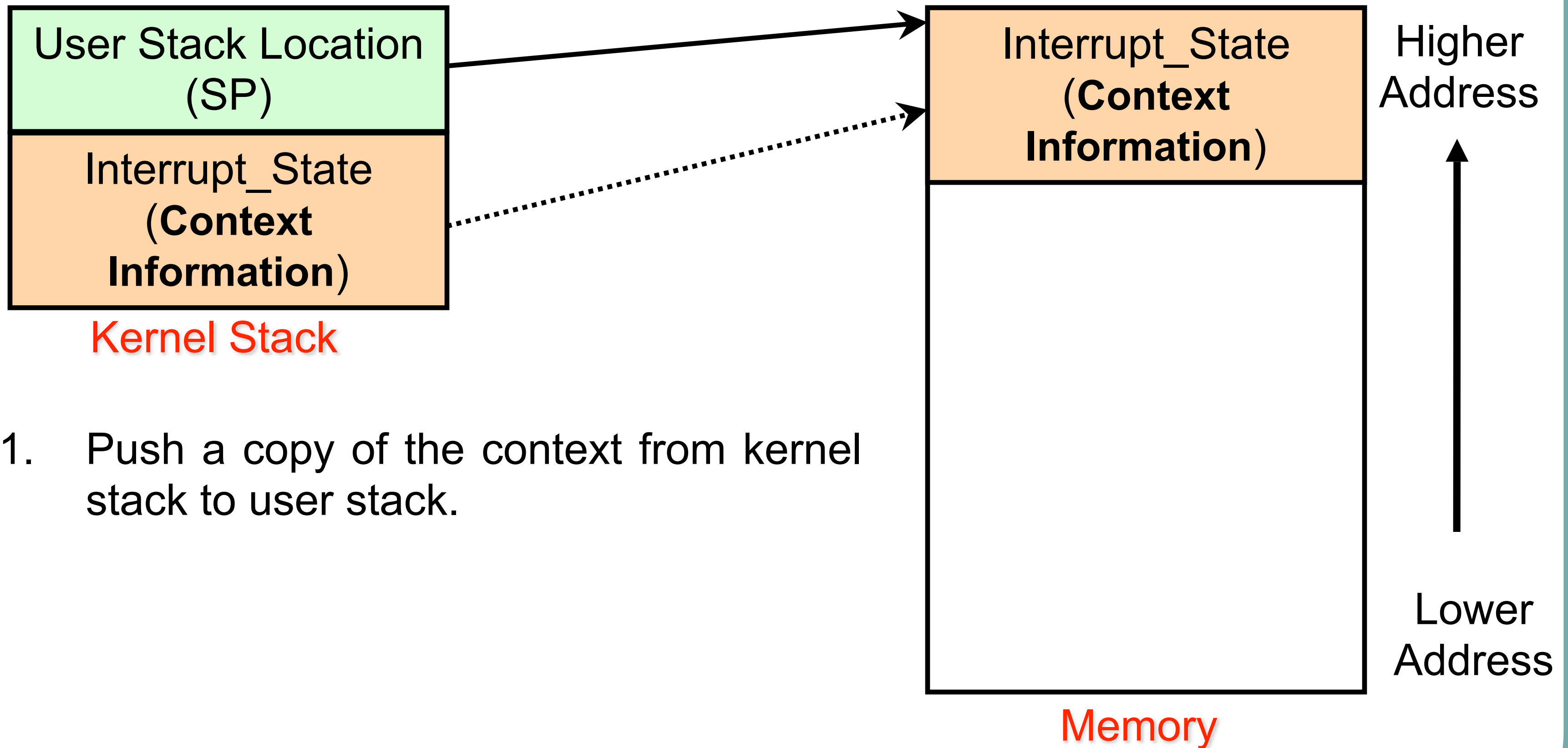

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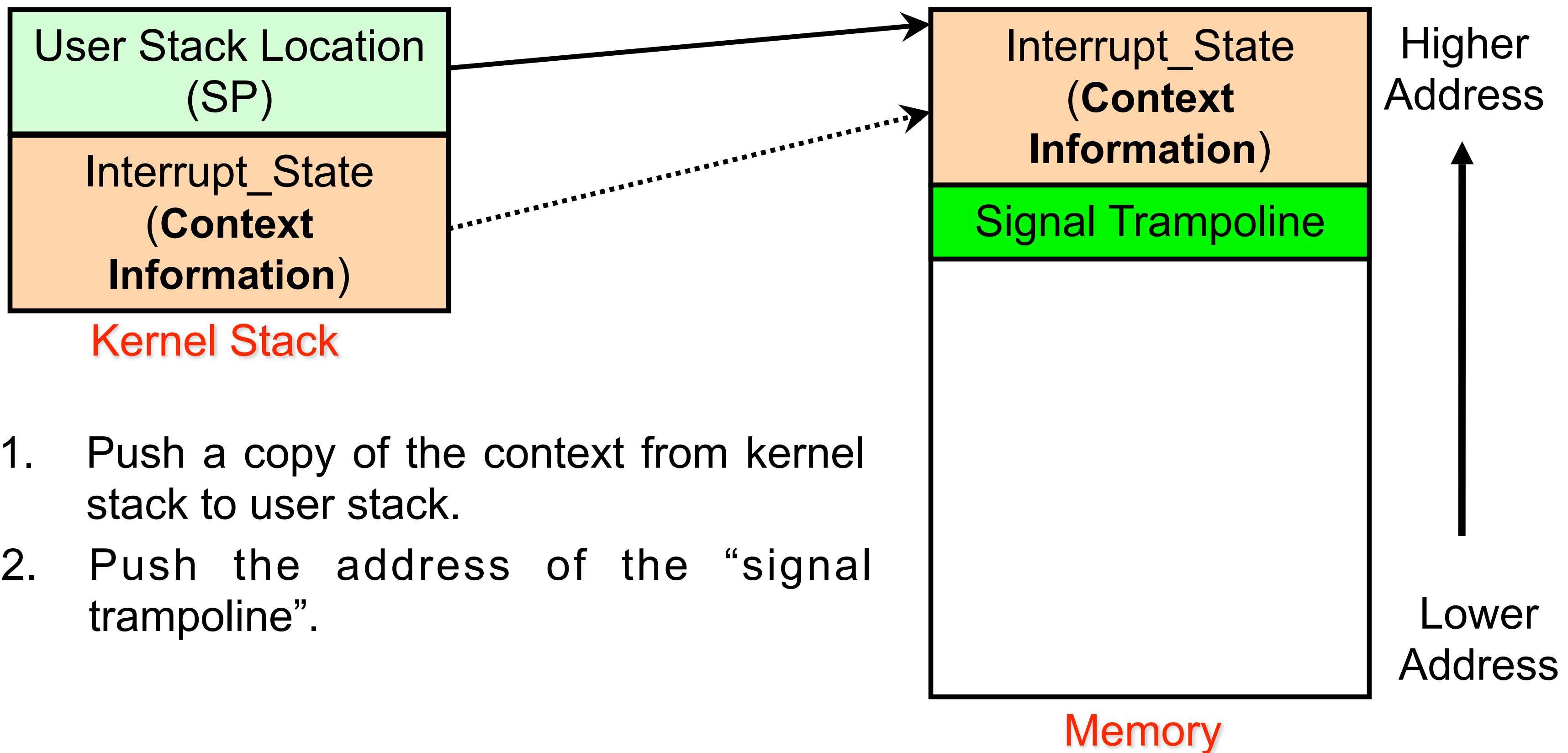

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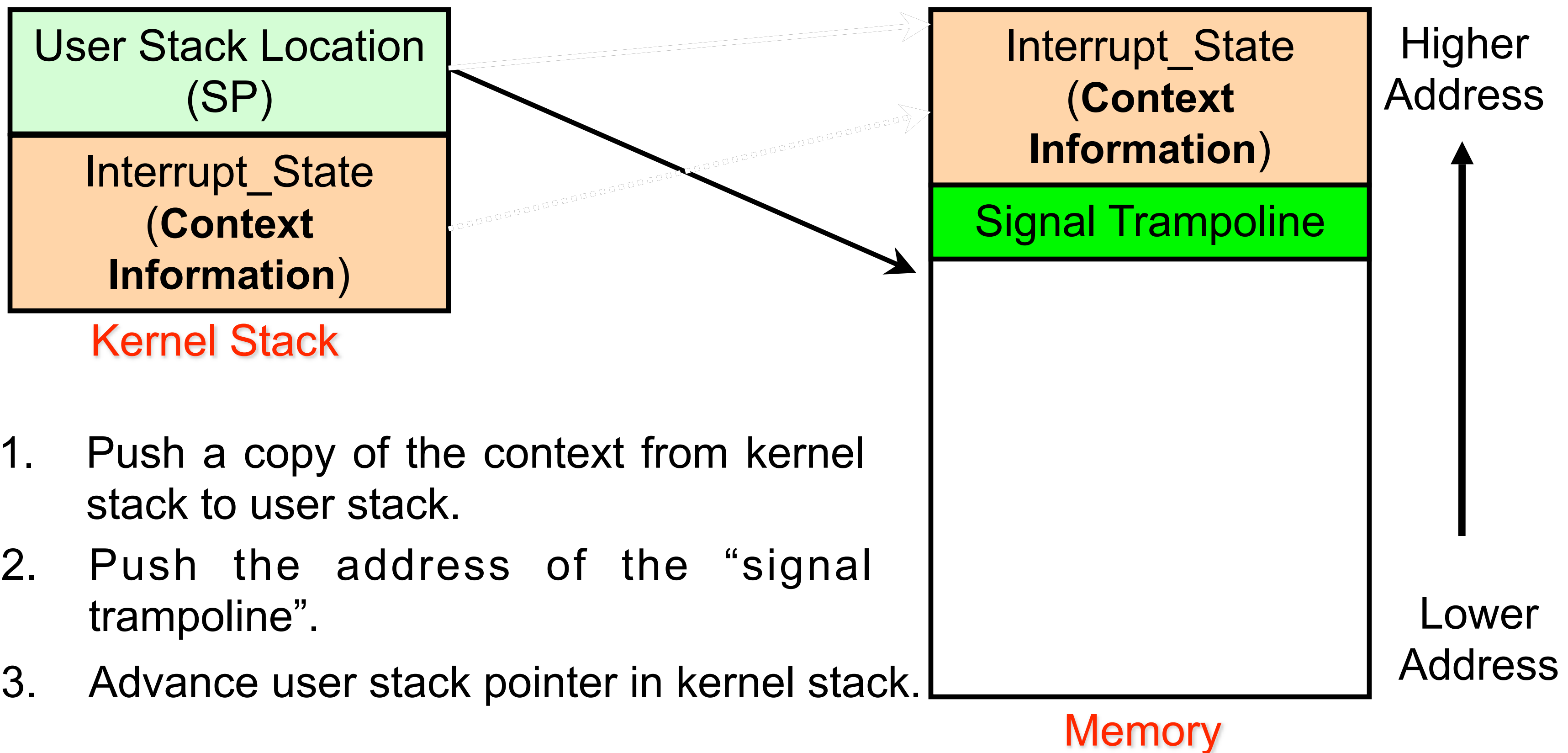

1. Push a copy of the context from kernel stack to user stack.
2. Push the address of the "signal trampoline".
3. Advance user stack pointer in kernel stack.

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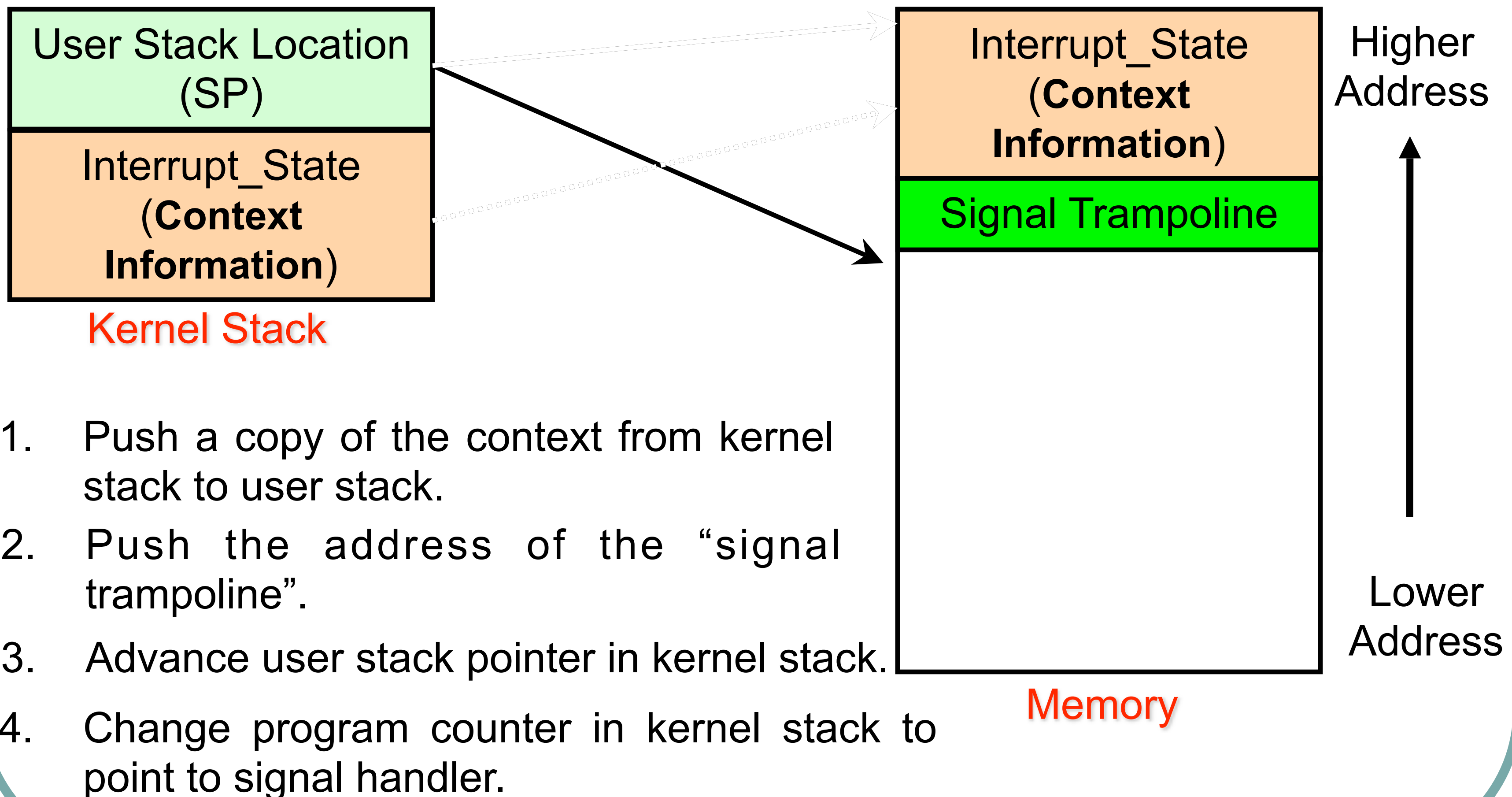
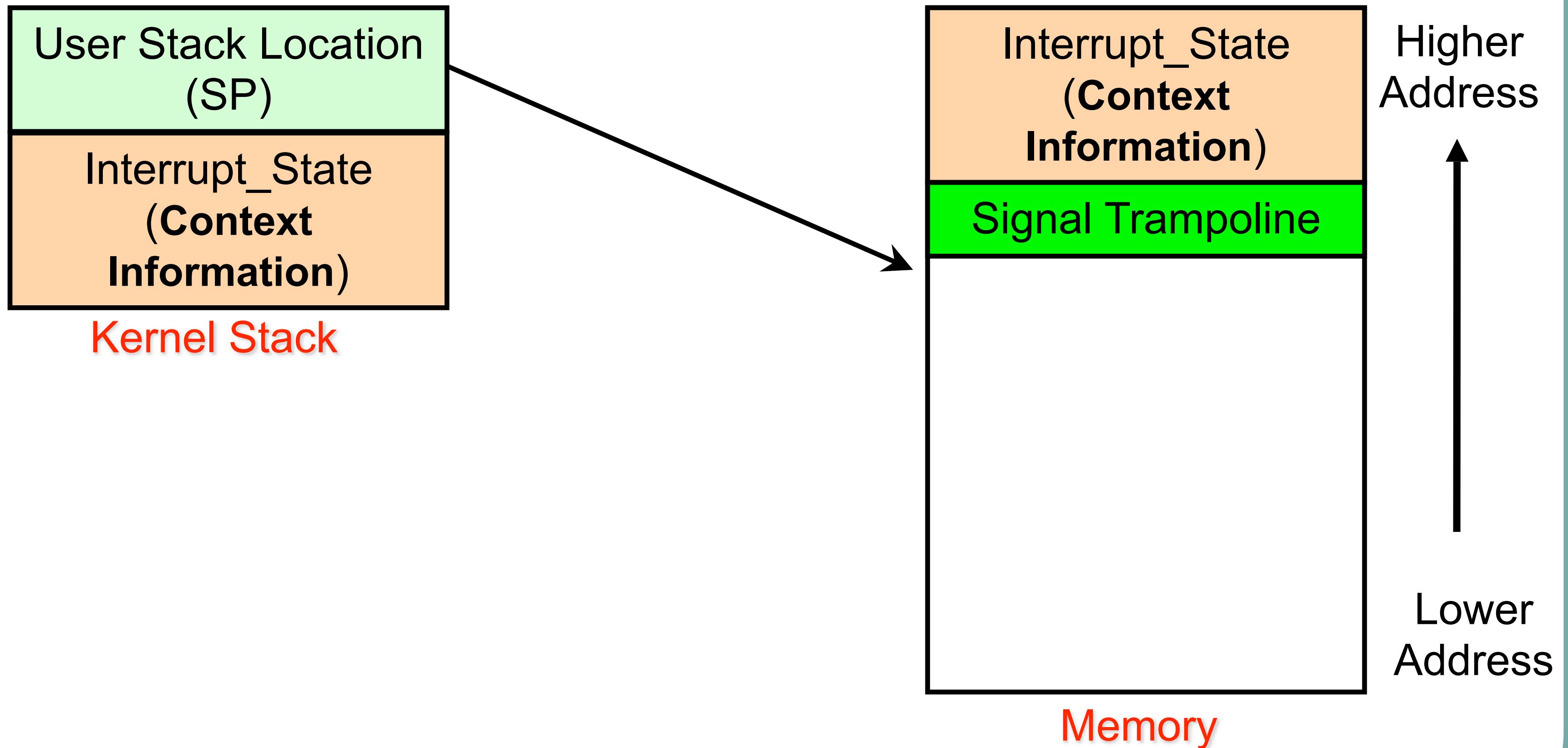


Complete_Handler



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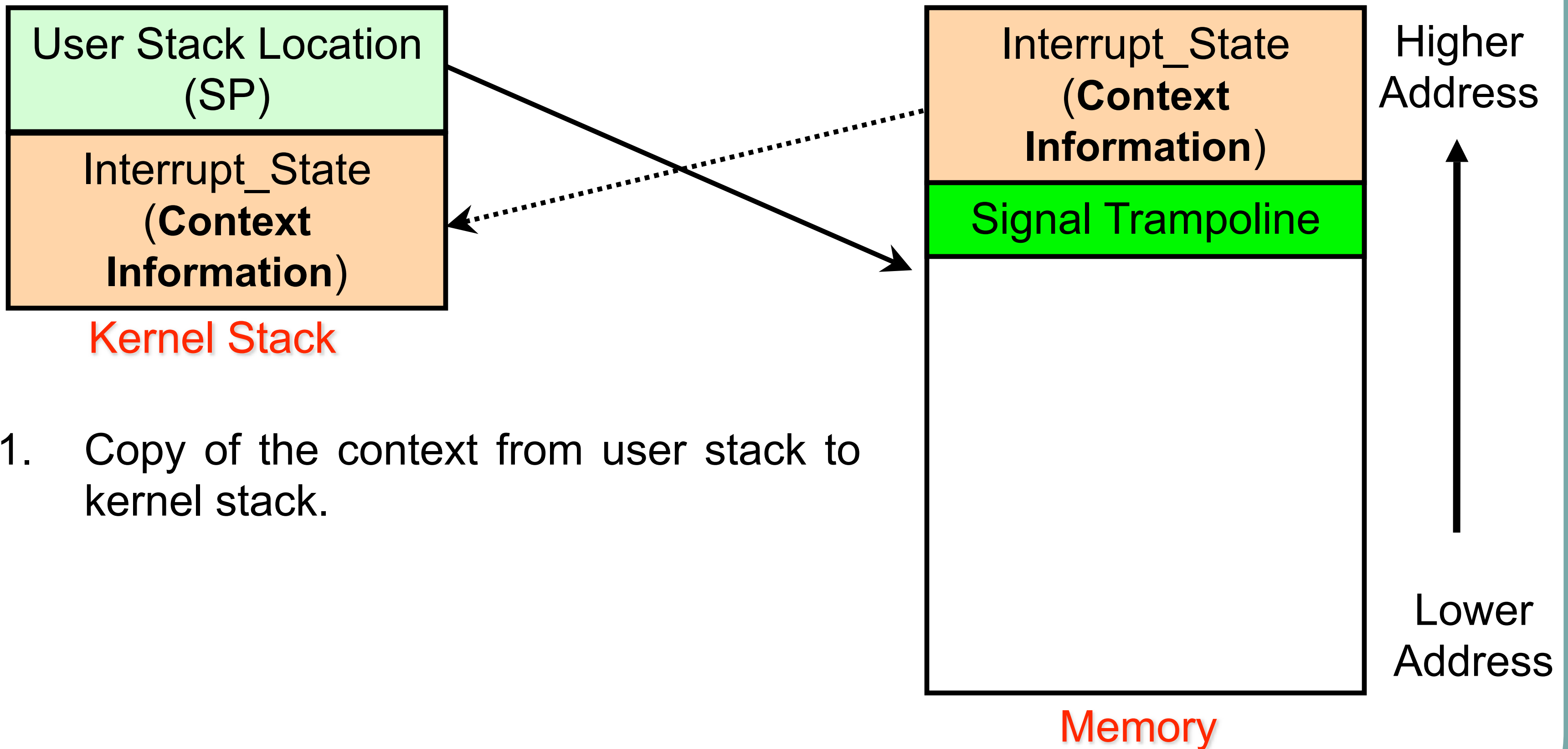

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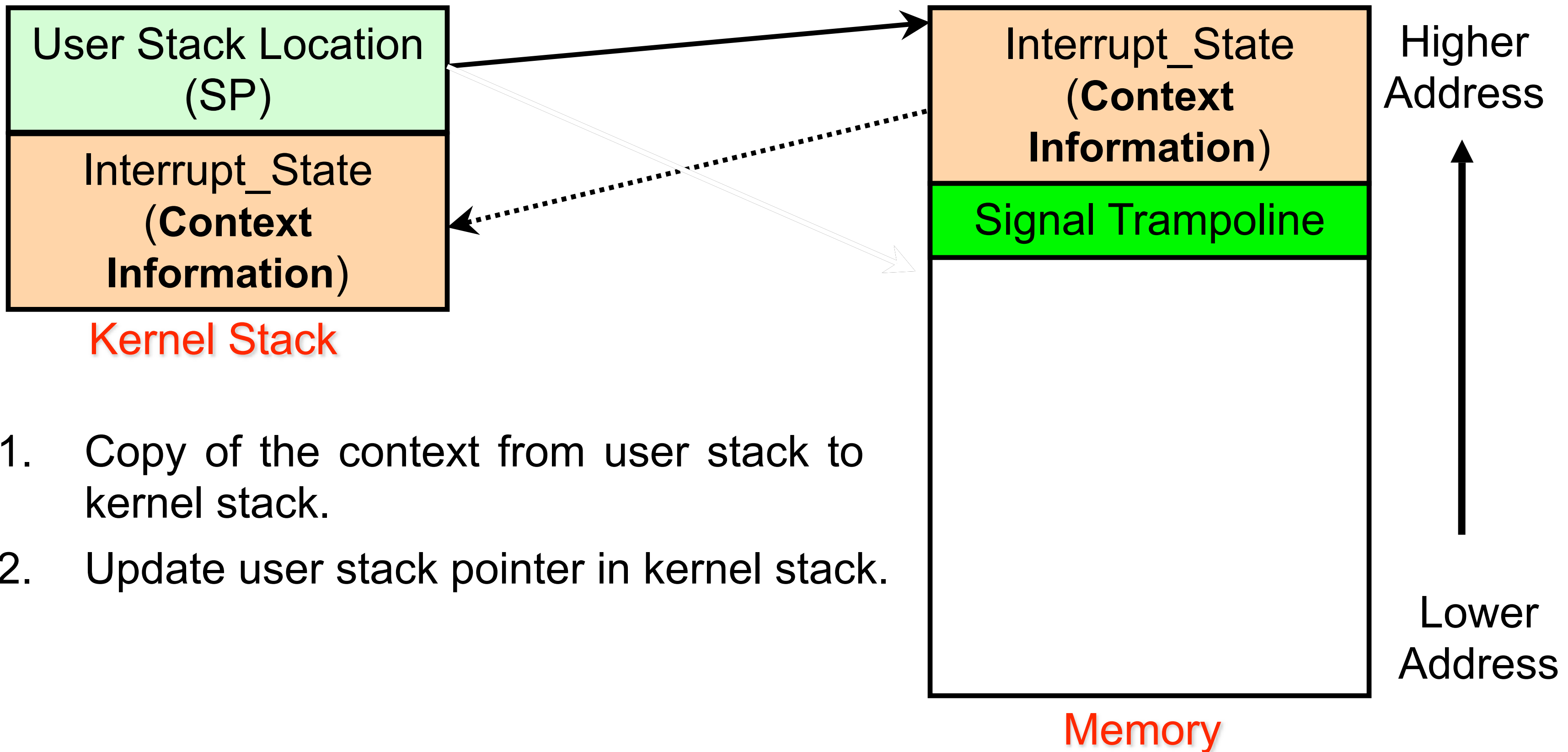

1. Copy of the context from user stack to kernel stack.
2. Update user stack pointer in kernel stack.