Module 4 - Additions

Frame Pointers

- Stack used to store variables local to procedures that don’t fit into registers: e.g. local arrays, structures.
- **Procedure frame**:
  - Segment of stack containing procedure’s saved registers, local variables

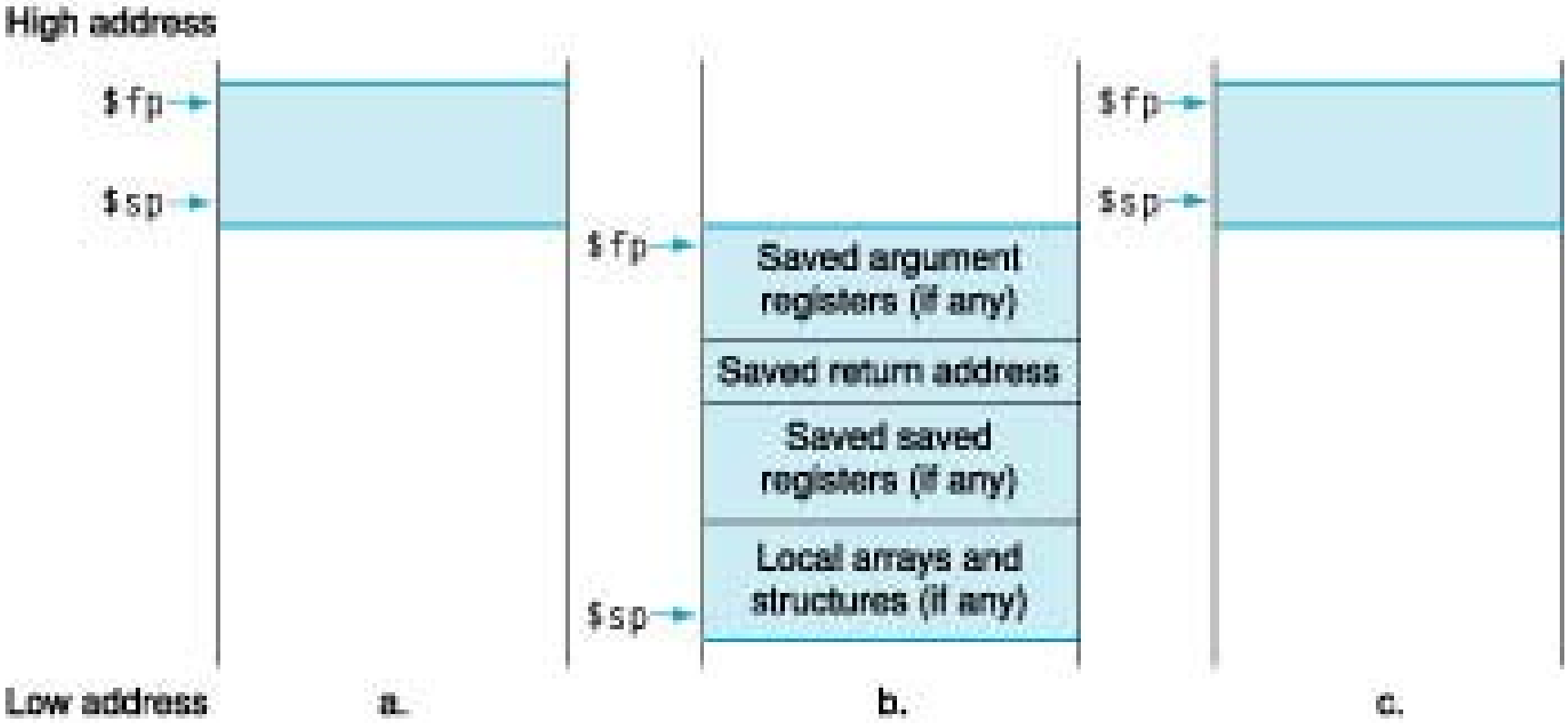
Frame Pointers

- Some MIPS use **frame pointer** ($fp) to point to first word of frame of procedure.
- Stack pointer might change during procedure -> references to local variable in memory might have different offsets depending on where they are in procedure.
- This makes procedure harder to understand.

Frame Pointers

- Frame pointer offers stable base register within procedure for local memory references.

Frame Pointers



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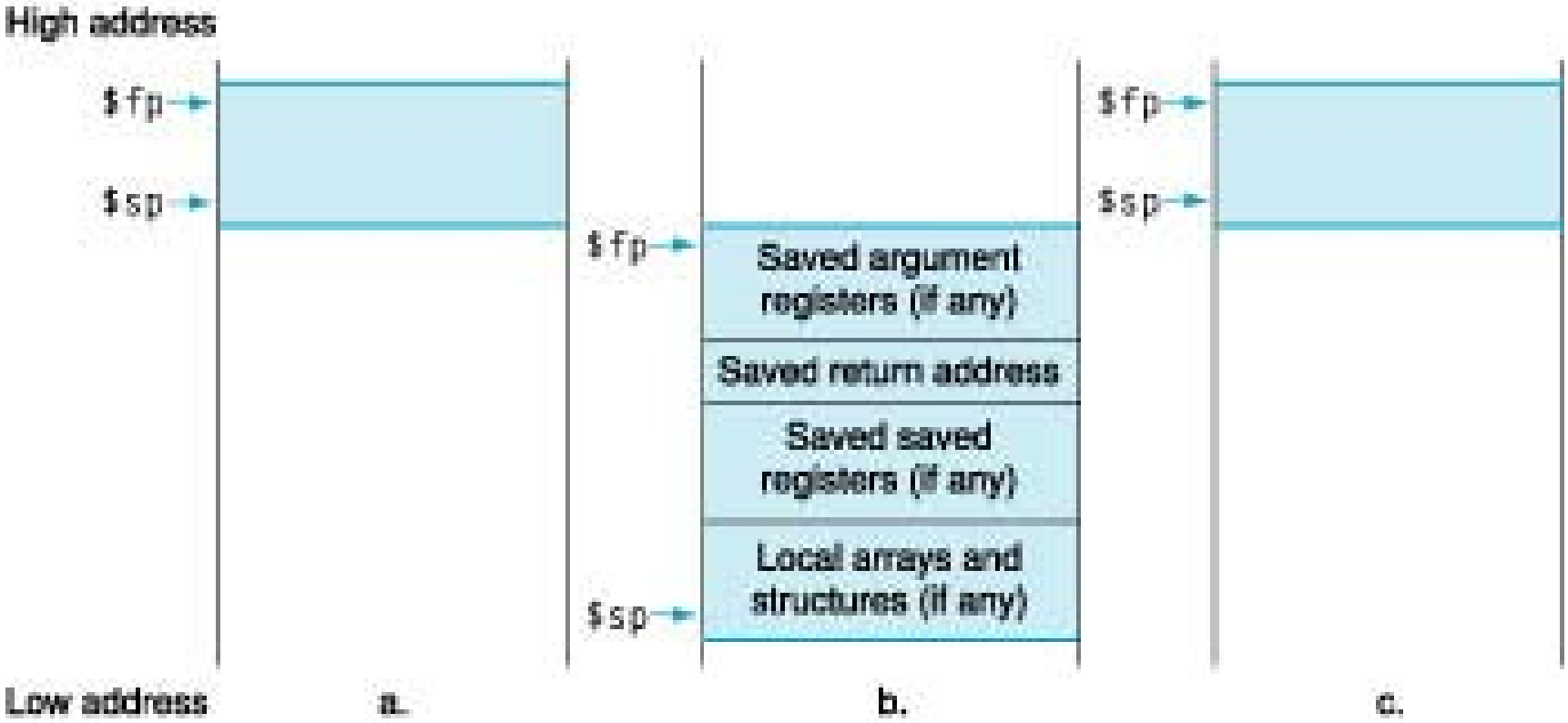
Stack (a) before, (b) during, (c) after procedure call.

Frame Pointers



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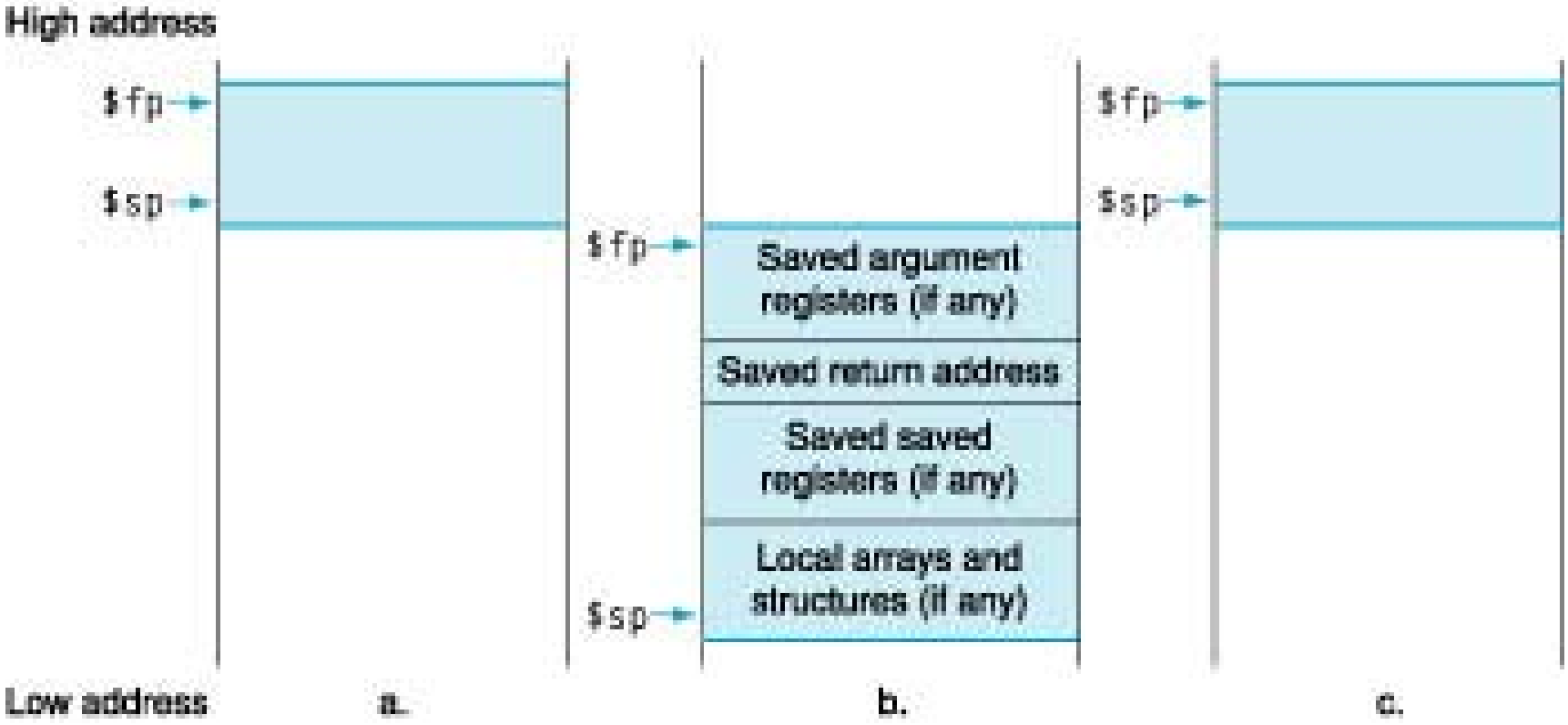
$fp points to first word of the frame. $sp points to top of the stack.

Frame Pointers



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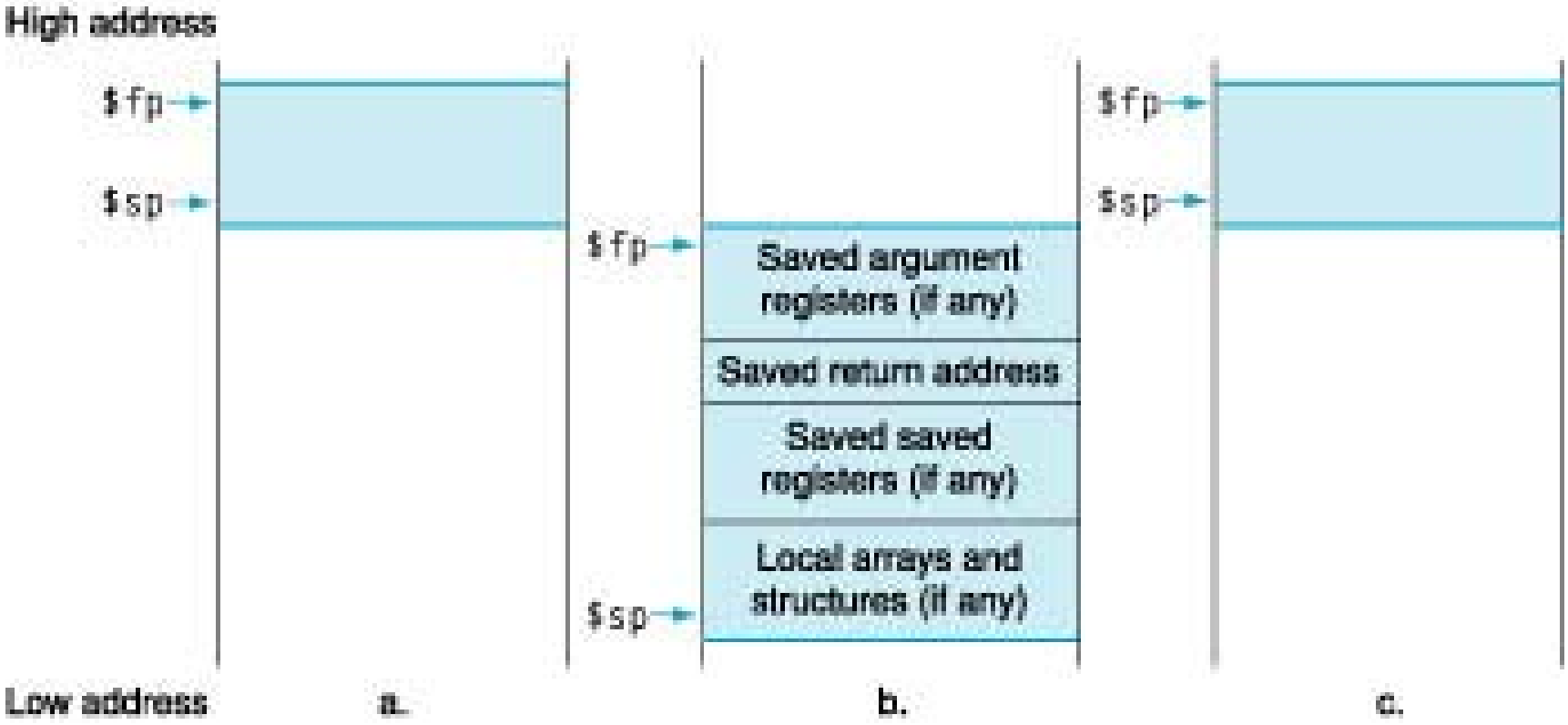
Stack adjusted to make room for all saved registers, local variables.

Frame Pointers



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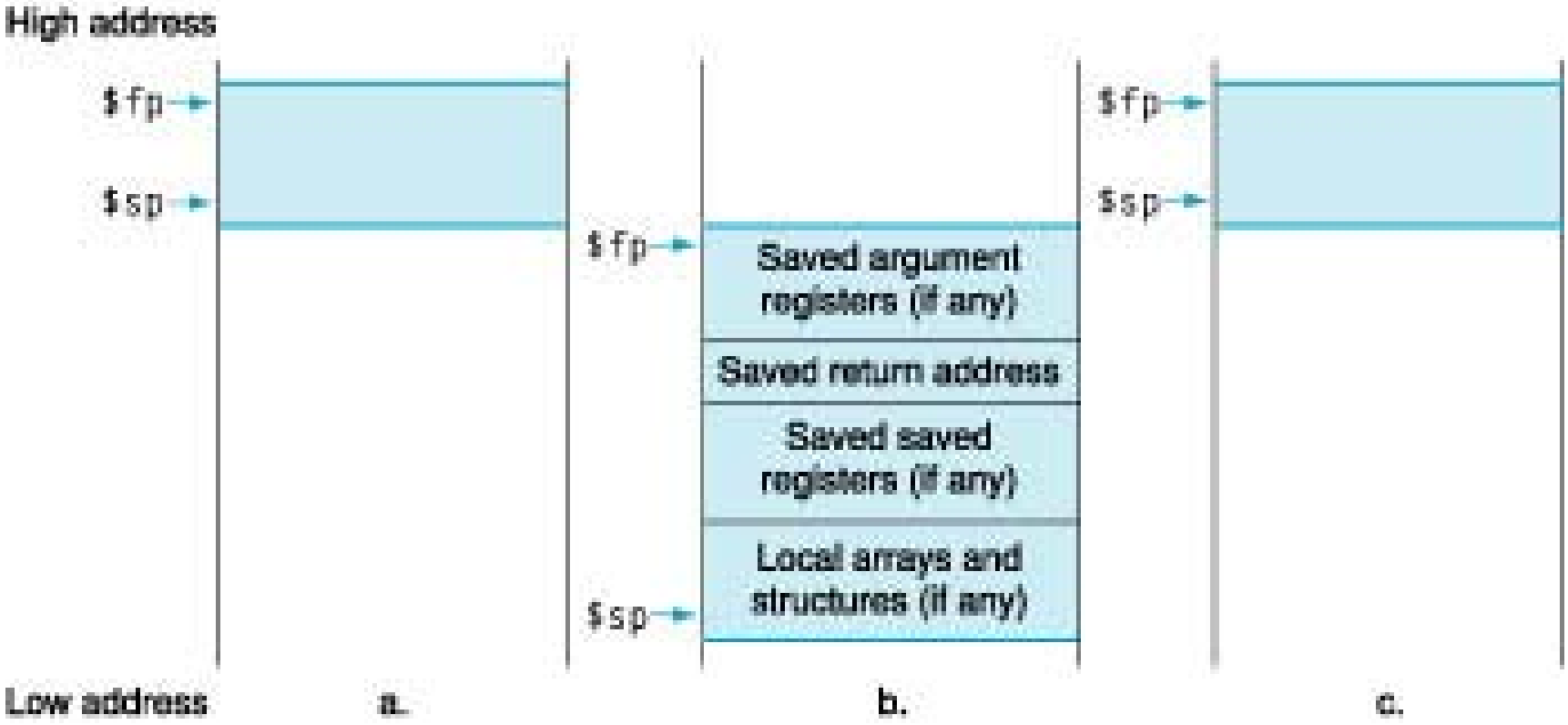
Stack pointer can change during procedure execution. Easier for programmers to reference variables via stable frame pointer.

Frame Pointers



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When $fp used, it is initialized using address in $sp on call. $sp restored using $fp.