Übungen zu Systemnahe Programmierung in C (SPiC) – Wintersemester 2022

Übung 4

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Lehrstuhl für Verteilte Systeme
und Betriebssysteme

FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG

TECHNISCHE FAKULTÄT

Vorstellung Aufgabe 2

Zeiger & Felder

Vertiefung: Zeiger

- Variable: `uint8_t x`
- Zeiger: `uint8_t *y`
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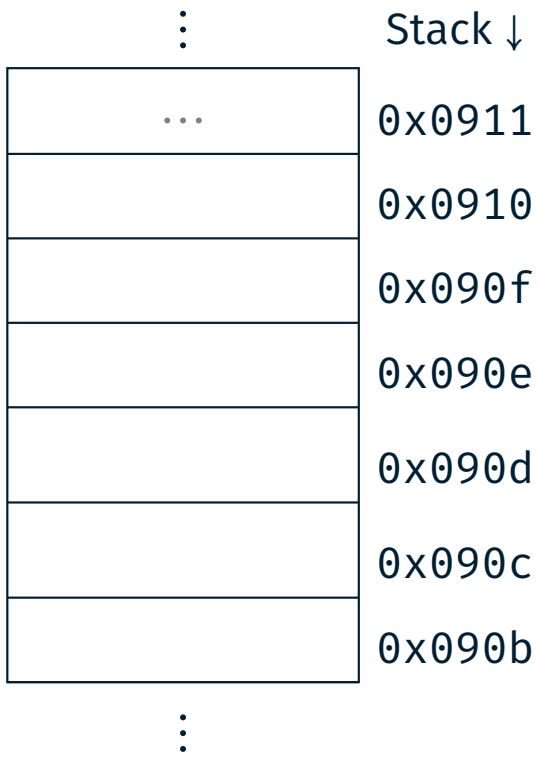

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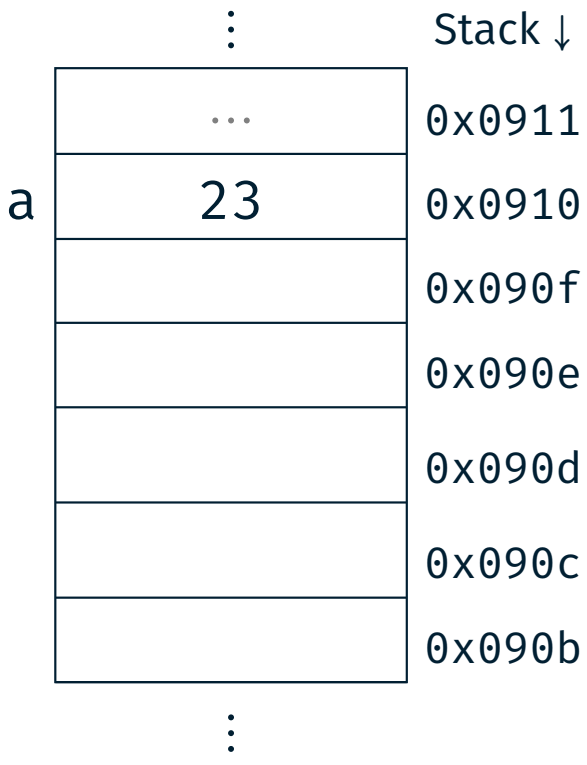

Achtung: Die genaue Anordnung der Variablen auf dem Stack ist abhängig vom Übersetzer und den gewählten Optimierungen!

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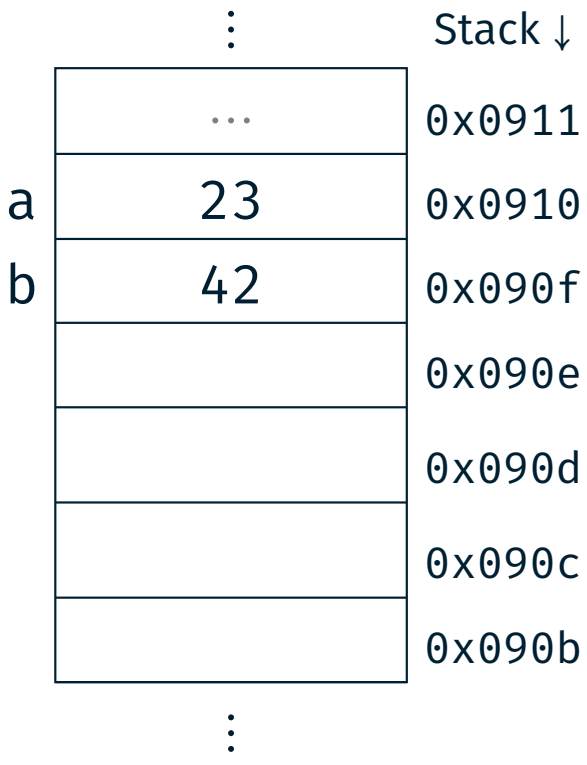

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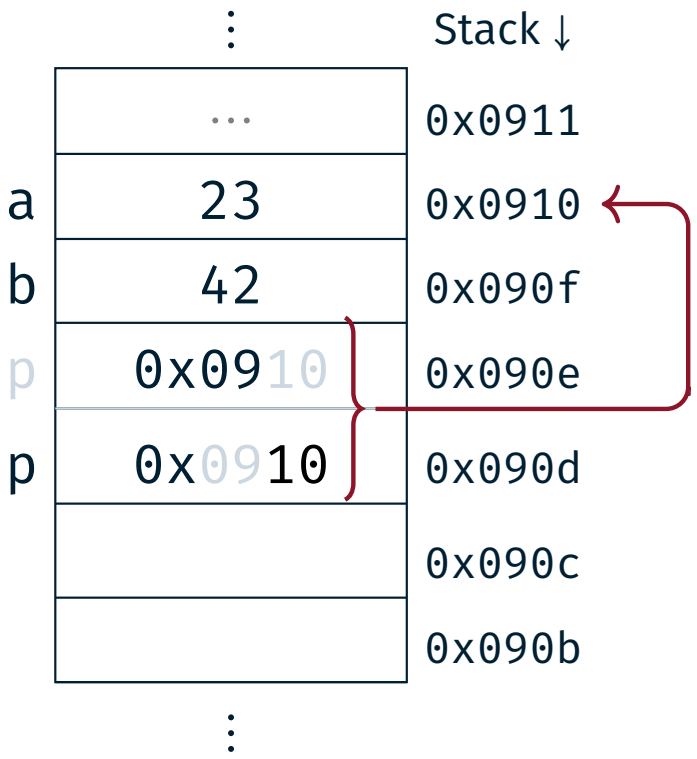

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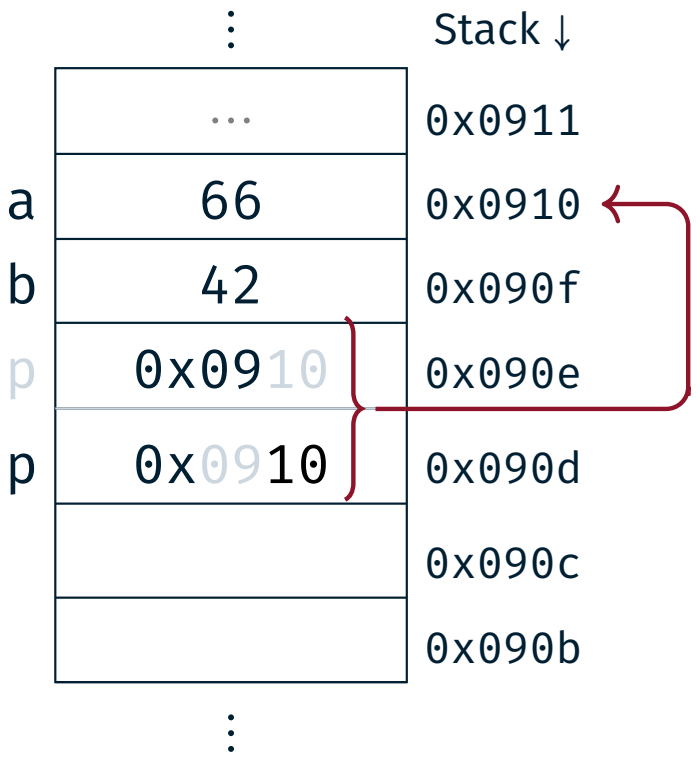

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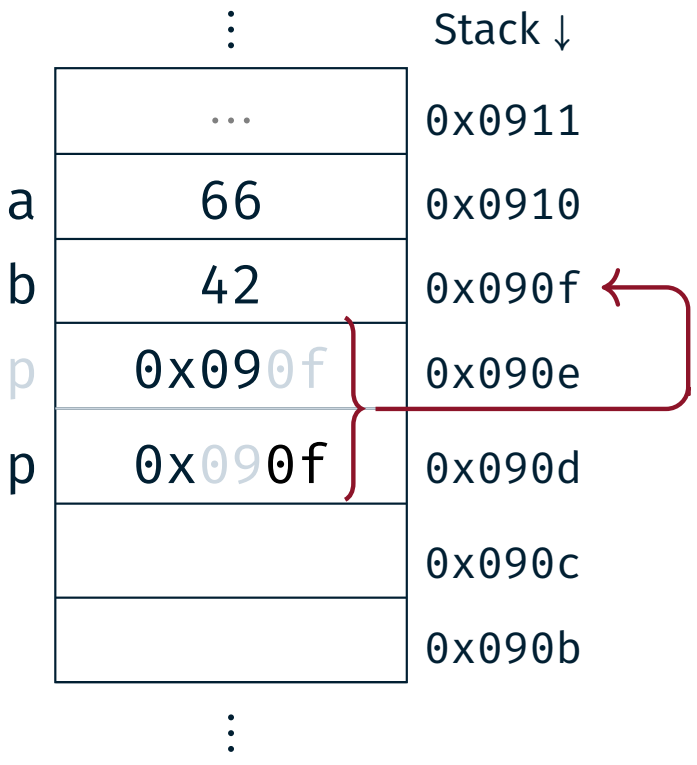

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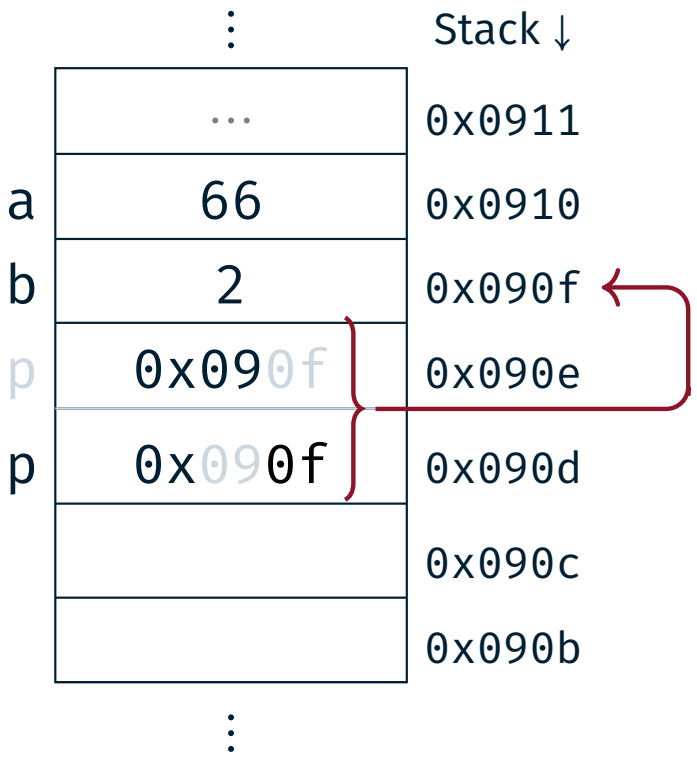

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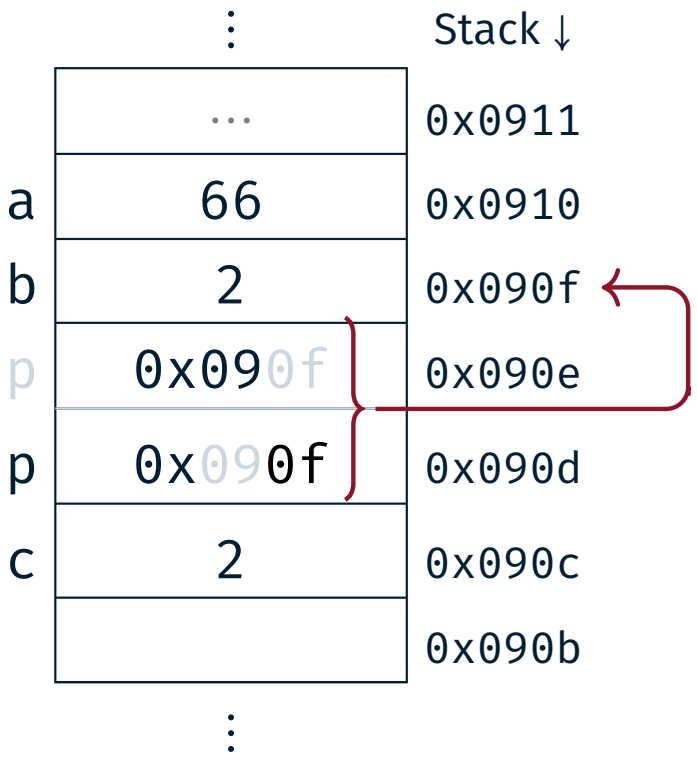

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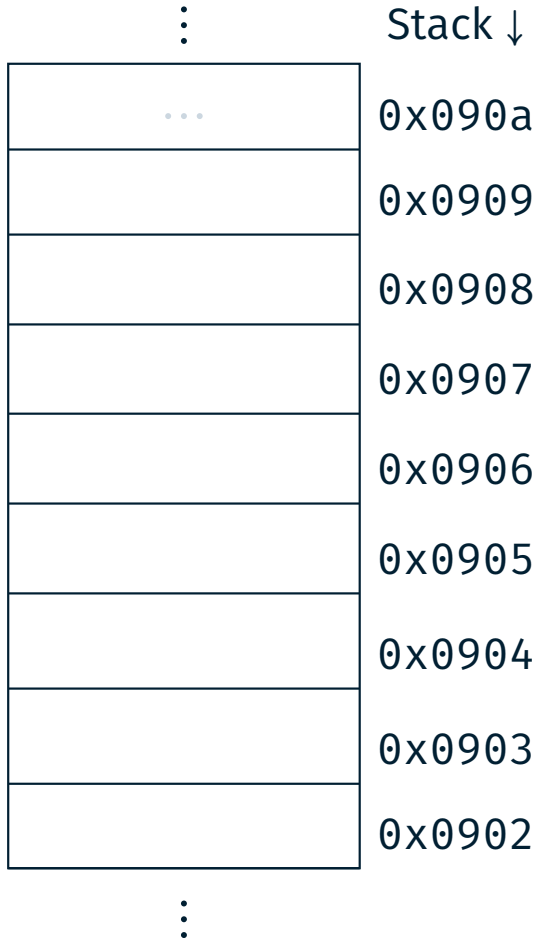

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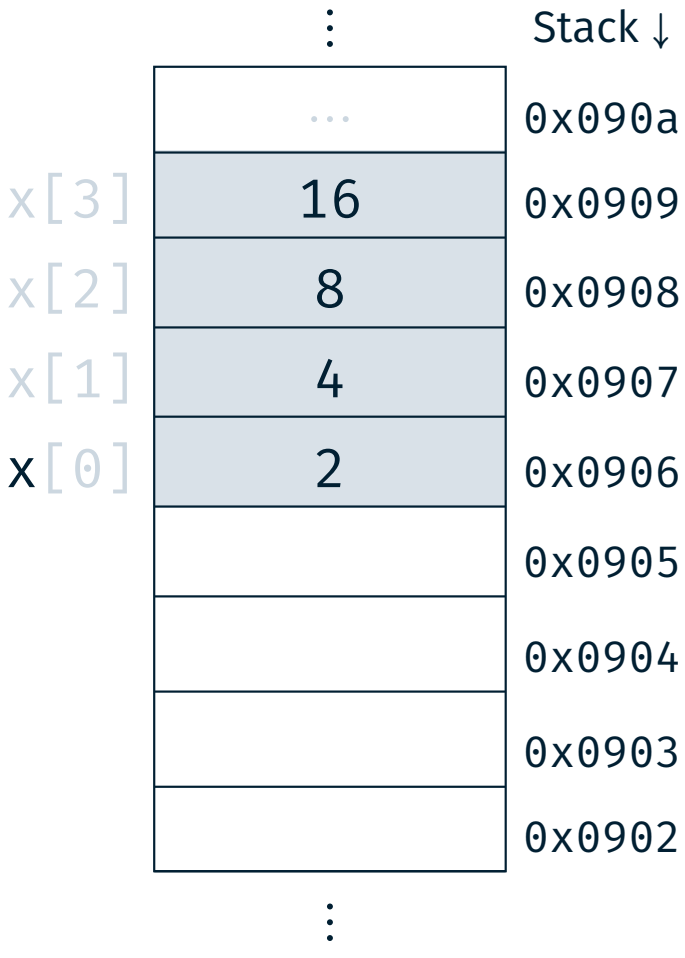

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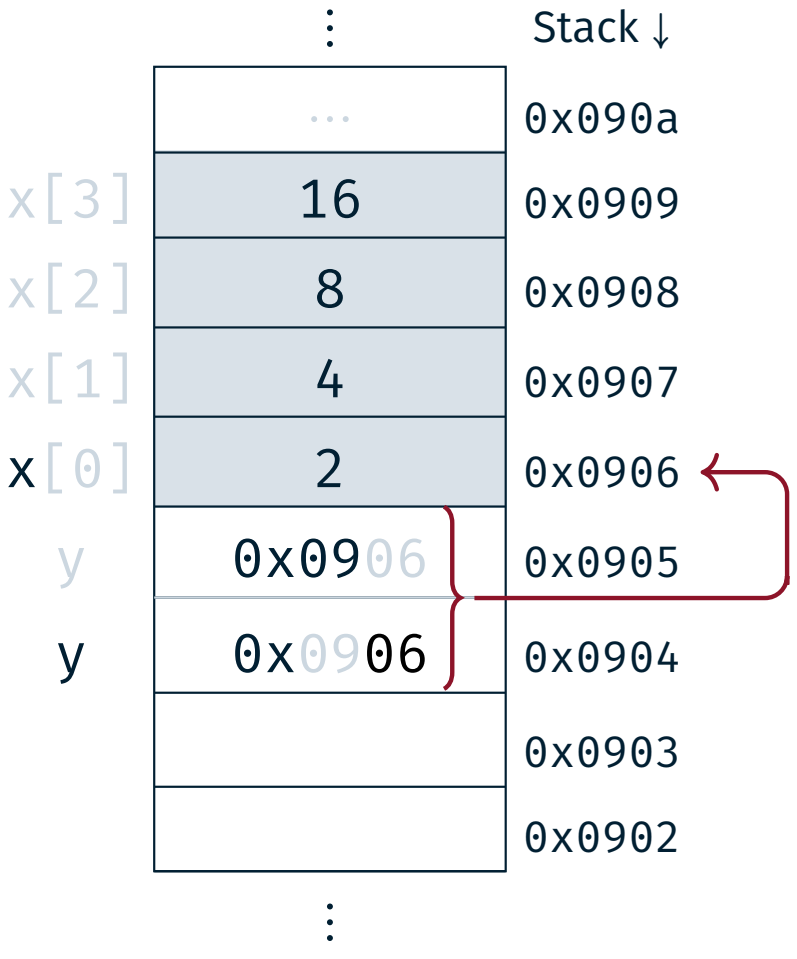

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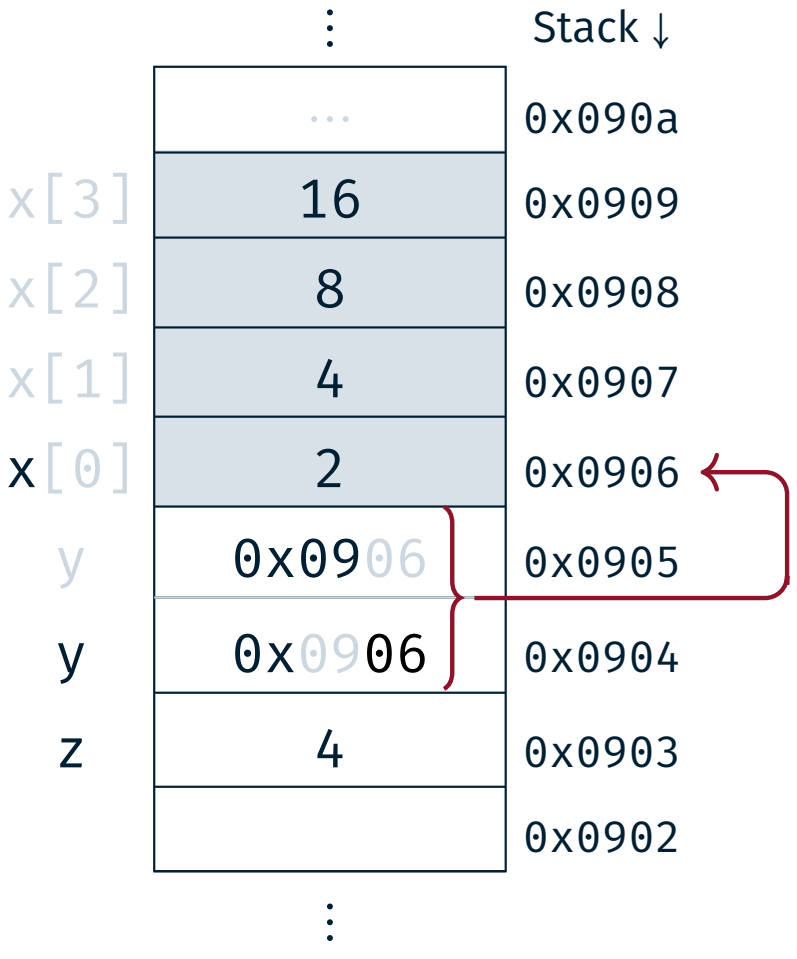

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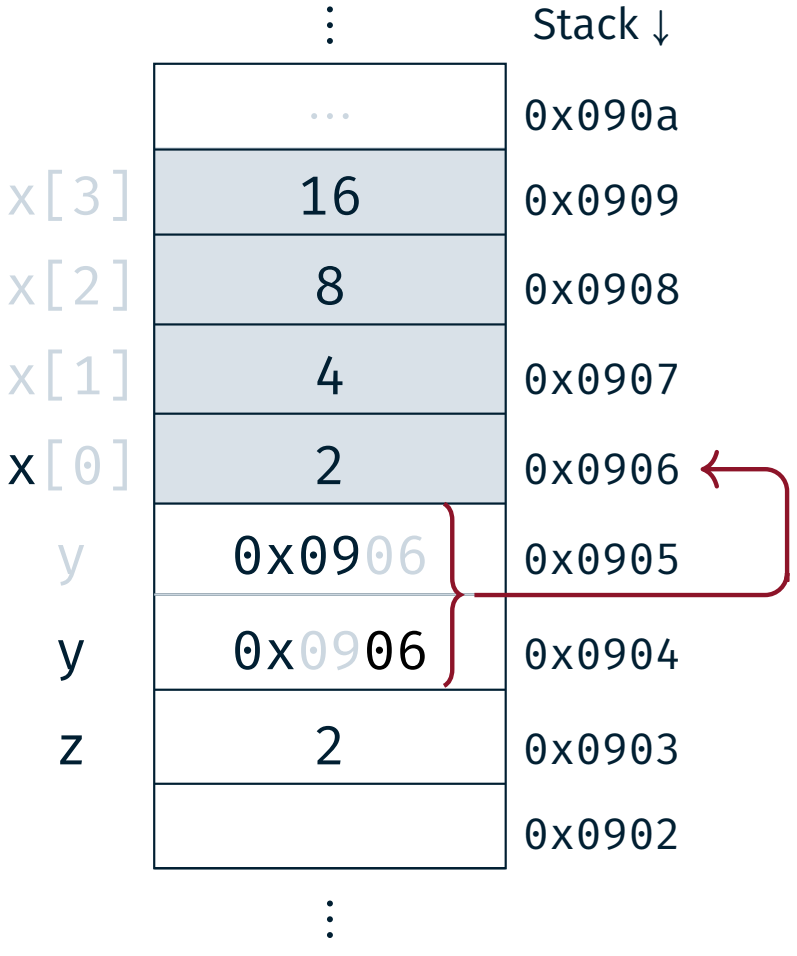

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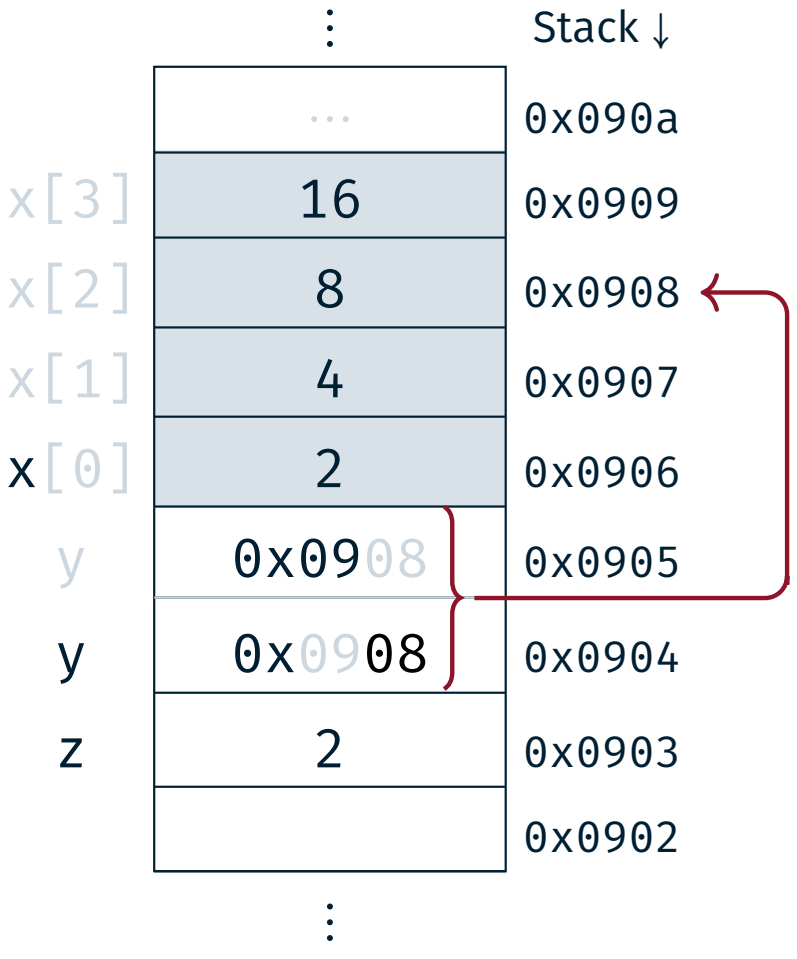

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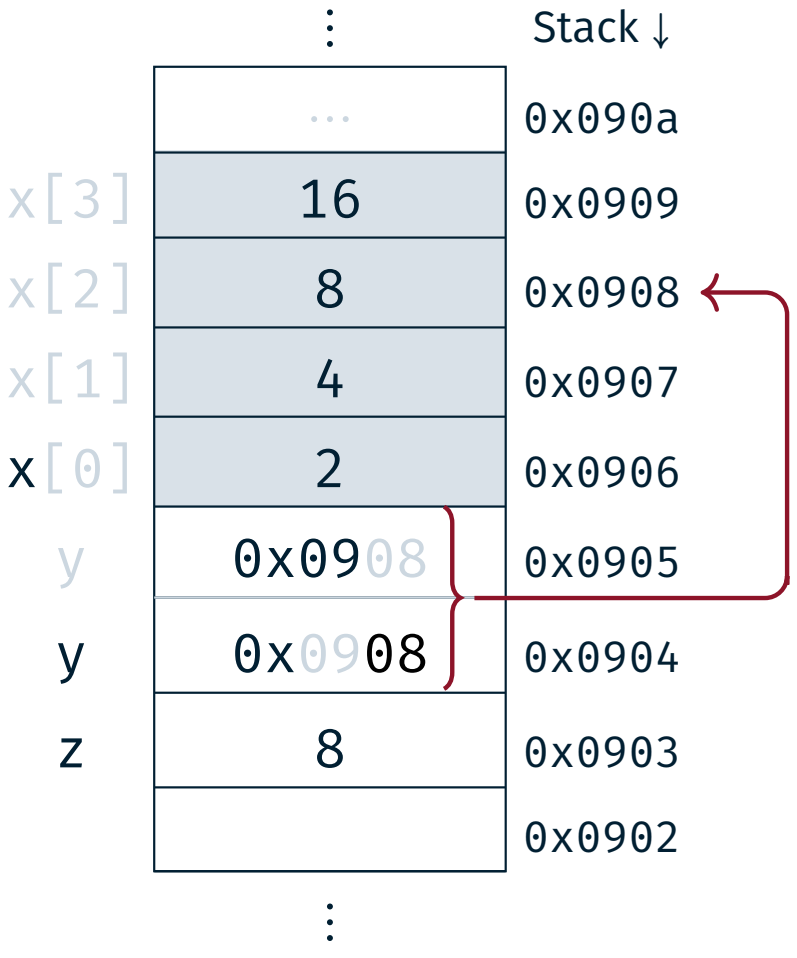

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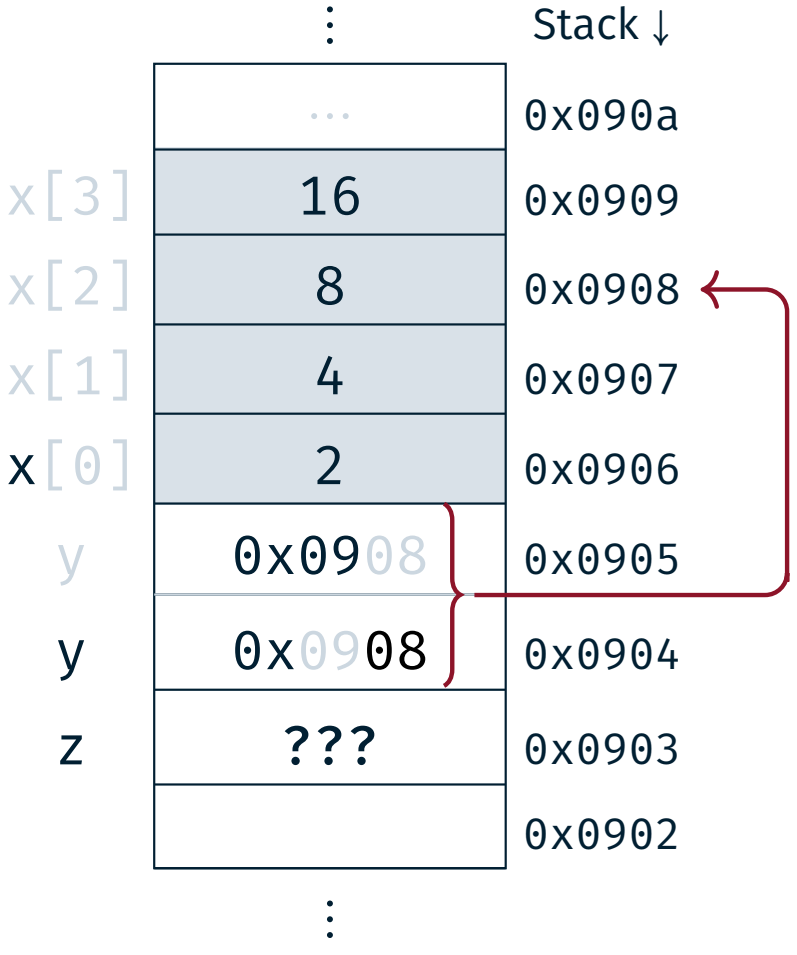

Hands-on: Zeiger

Kein Screencast

Hands-on: Zeiger, Felder & Strukturen

- Call-by-Value vs. Call-by-Reference
- Zeiger und Felder
- Zeigerarithmetik
- `struct` für GPS-Koordinaten
- Feld von GPS-Koordinaten
- Funktionszeiger

Kompilierbar für das SPiCboard (serielle Konsole), den SPiCsim oder Linux

Quellcode:
`https://sys.cs.fau.de/lehre/WS22/spic/uebung/material/pointer.c`

Hands-on: Laufschrift

Screencast: `https://www.video.uni-erlangen.de/clip/id/18170`

Vertiefung: Strings

- `char`: Einzelnes Zeichen (z.B. `'a'`)
- String: Array von `chars` (z.B. `"Hello"`)
- In C: Letztes Zeichen eines Strings: `'\0'`
  ⇒ Speicherbedarf: strlen(s) + 1

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03 c = s[4];
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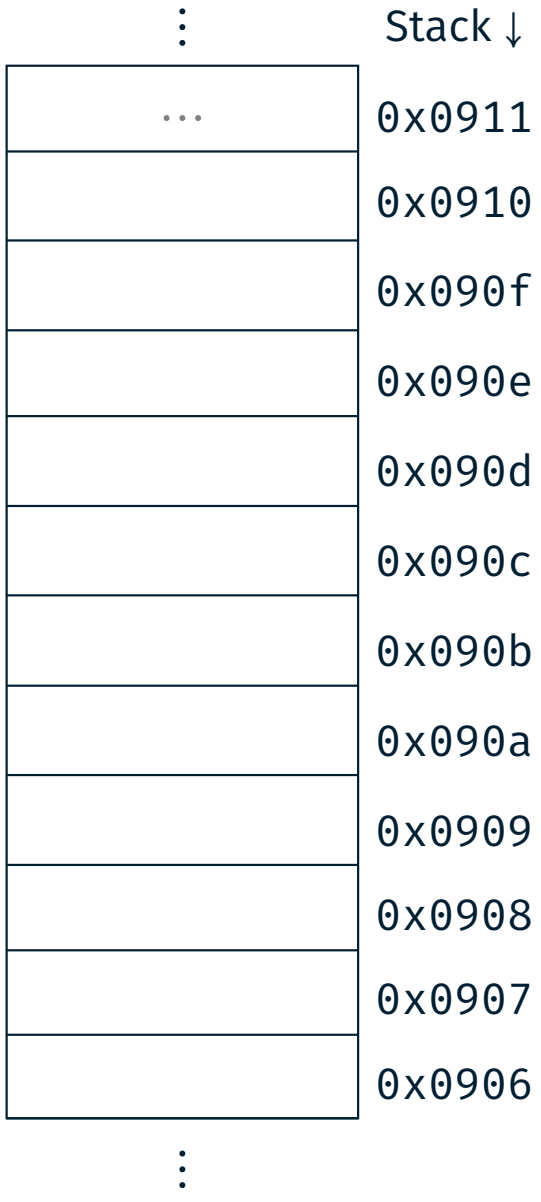

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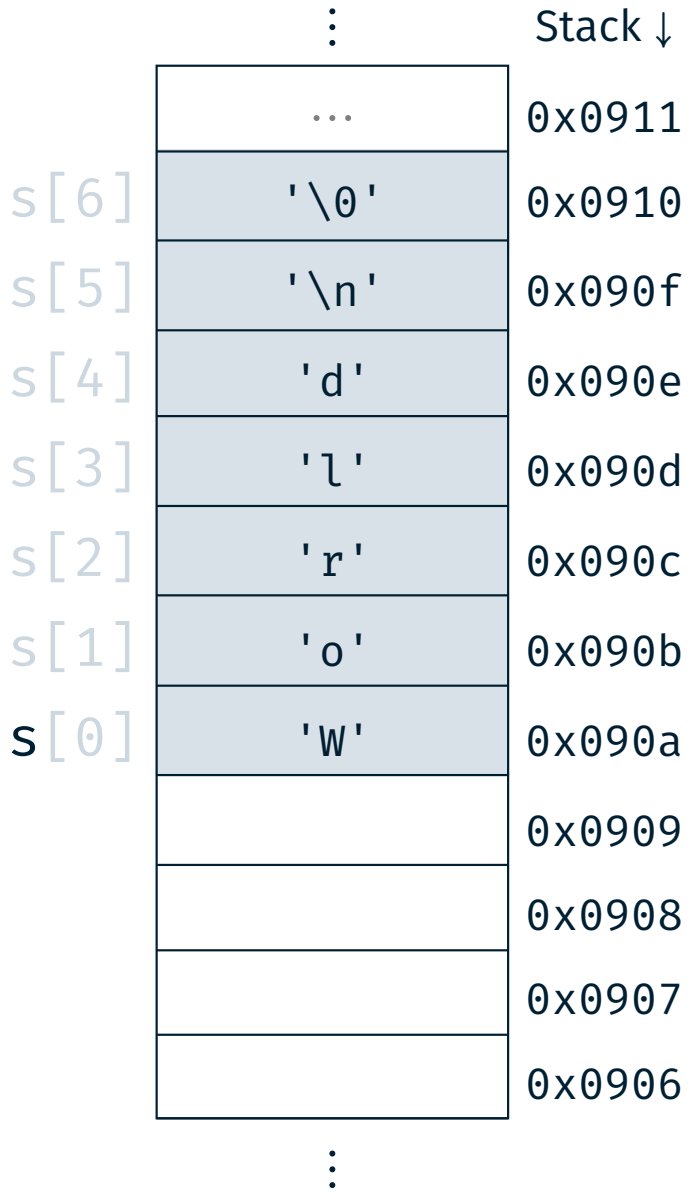

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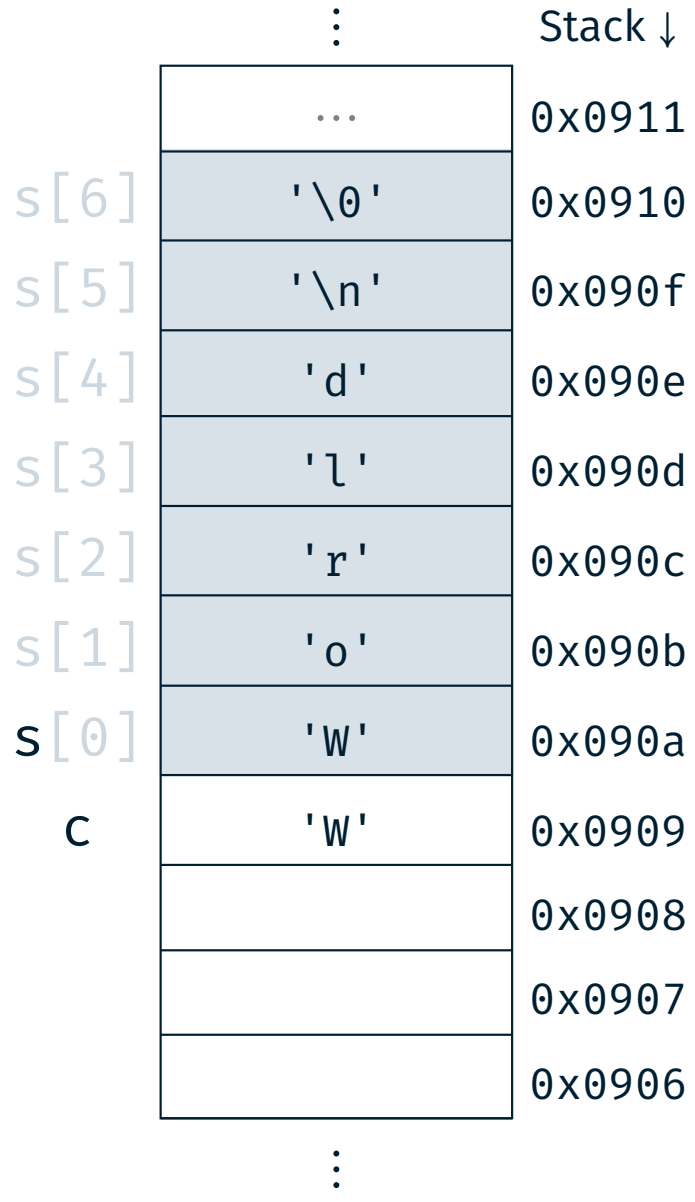

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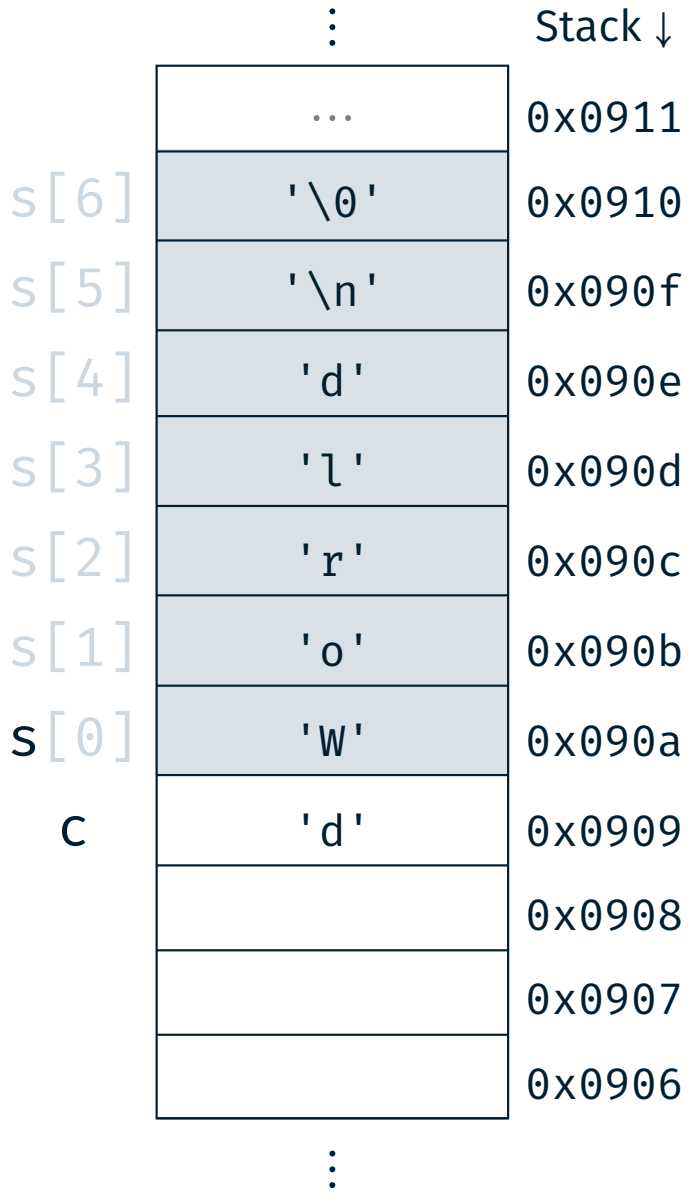

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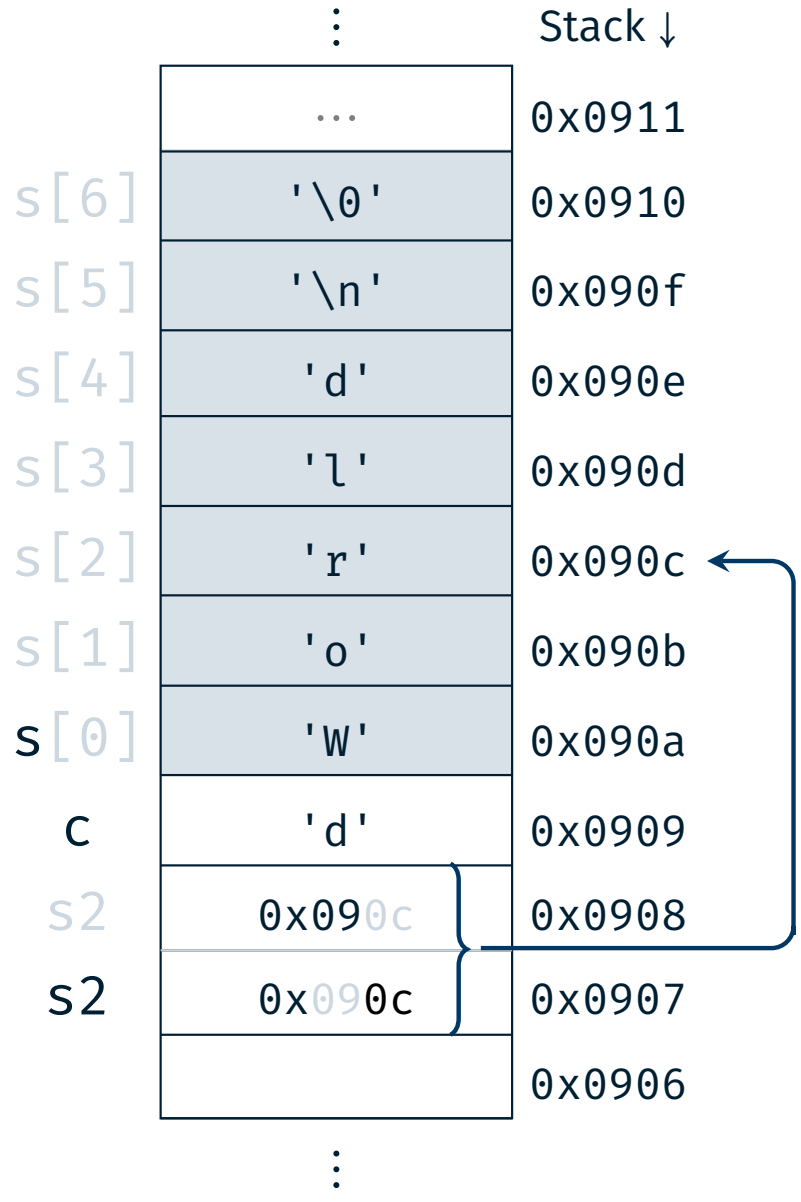

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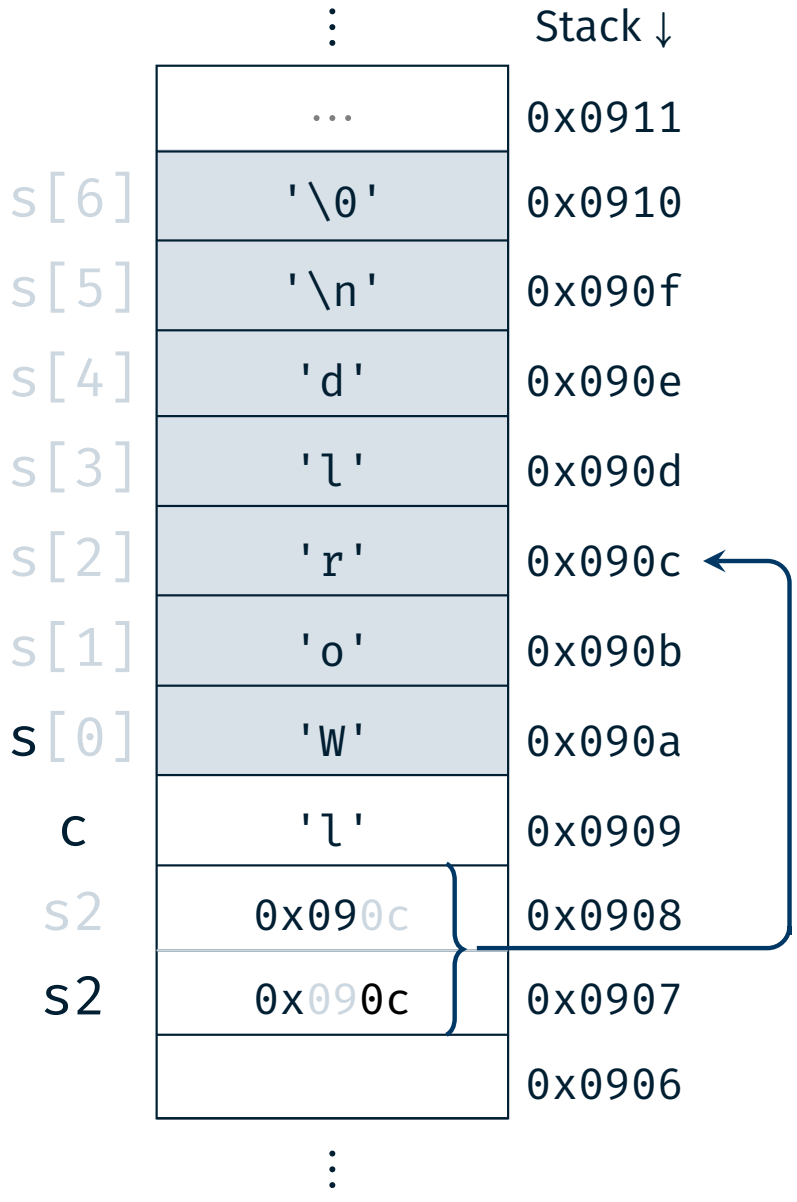

Hands-on: Laufschrift

- Funktionsweise:
  Schrittweises Anzeigen eines Textes auf der 7-Segment-Anzeige
- Lernziele:
  - Zeichenketten in C
  - Zeiger & Zeigerarithmetik
  - Alarme & Schlafenlegen
- Vorgehen:
  - Wiederkehrender Alarm mittels `TIMER0`
  - Zusammensetzen des aktuellen Teilstrings
  - Ausgabe über 7-Segment-Anzeige
  - In Wartephasen Mikrocontroller in den Energiesparmodus versetzen (Passives Warten)

Hands-on: Laufschrift – Bestimmung des Teilstrings

```
01 const char *string = "HALLO SPIC";
02 const char *current = string;
03 // current[0] == 'H' && current[1] == 'A'
04 ++current;
05 // current[0] == 'A' && current[1] == 'L'
06 // [...]
07 // current[0] == '\0', current[1] == ??
08 current = string;
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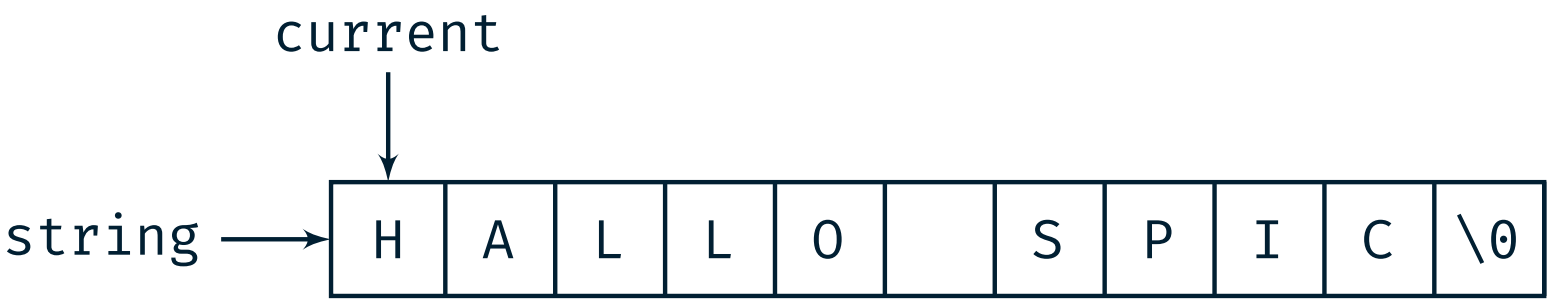

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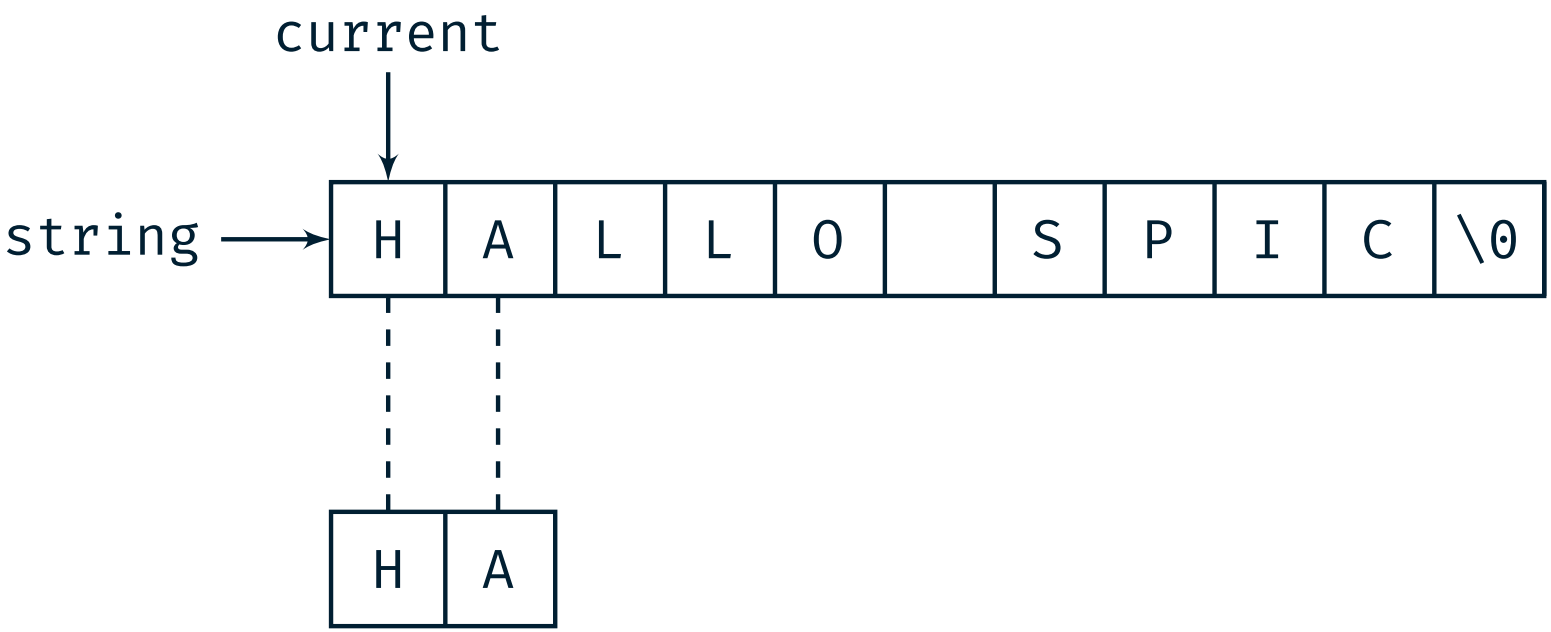

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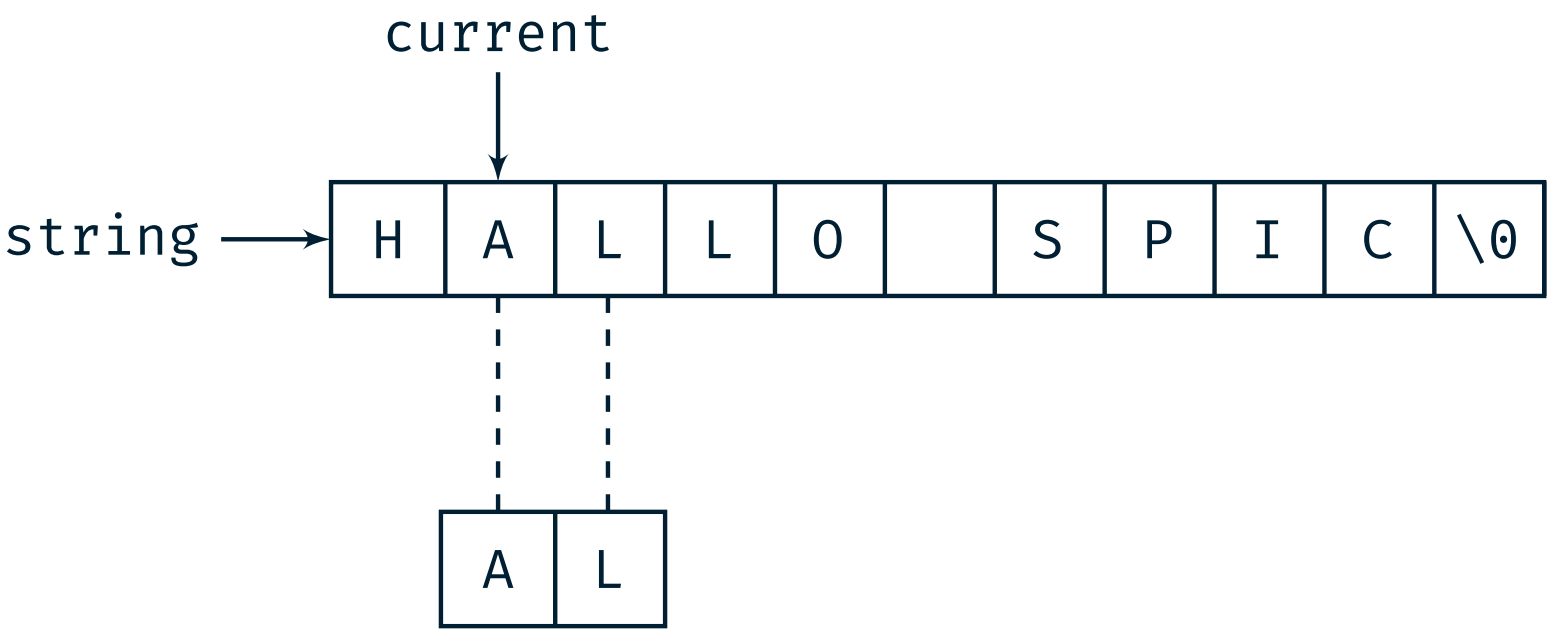

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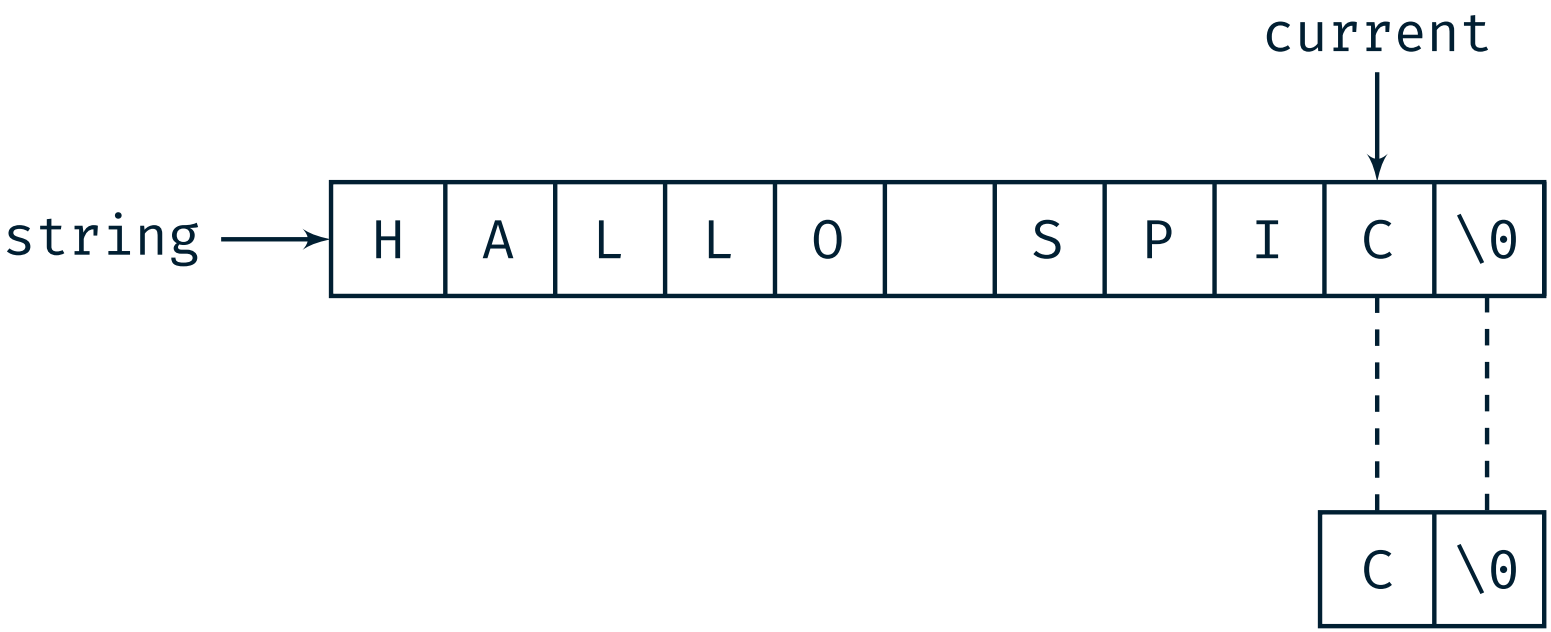

Hands-on: Laufschrift – Bestimmung des Teilstrings

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01 const char *string = "HALLO SPIC";
02 const char *current = string;
03 // current[0] == 'H' && current[1] == 'A'
04 ++current;
05 // current[0] == 'A' && current[1] == 'L'
06 // [...]
07 // current[0] == '\0', current[1] == ??
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```

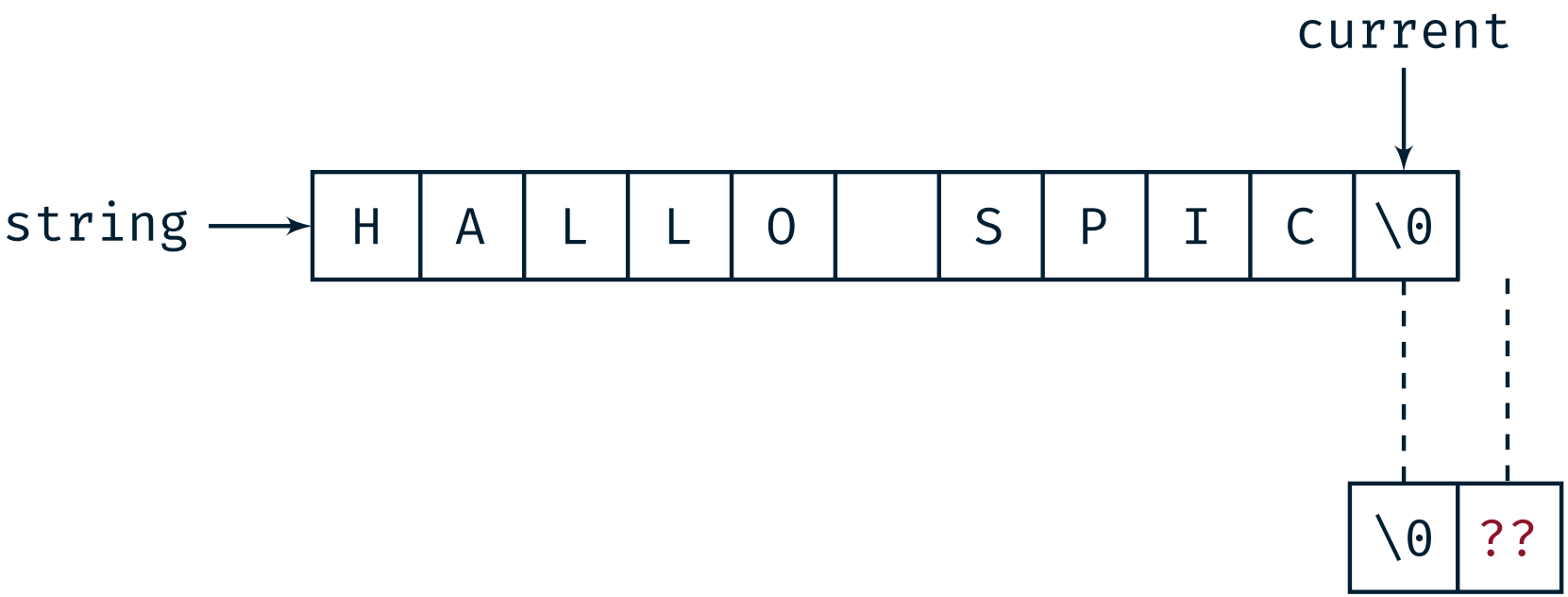

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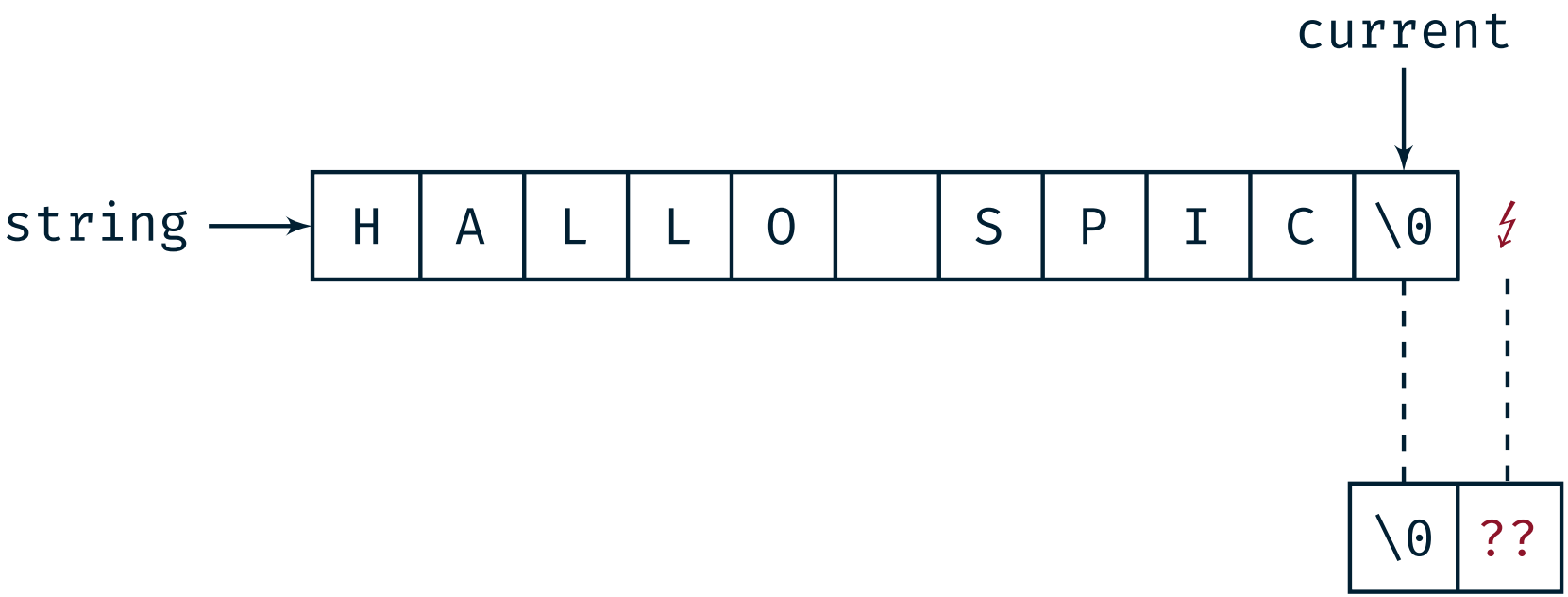

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