

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

## Übung 4

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Lehrstuhl für Verteilte Systeme  
und Betriebssysteme



## Zeiger & Felder

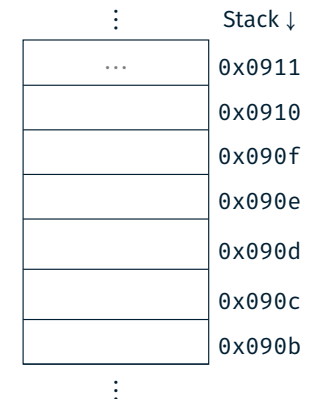
## Vorstellung Aufgabe 2

### Vertiefung: Zeiger



- Variable: `uint8_t x`
- Zeiger: `uint8_t *y`
- Adressoperator: `&x`
- Verweisoperator: `*y`

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01 uint8_t a = 23;  
02 uint8_t b = 42;  
03 uint8_t * p = &a;  
04 *p = 66;  
05 p = &b;  
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07 uint8_t c = *p;
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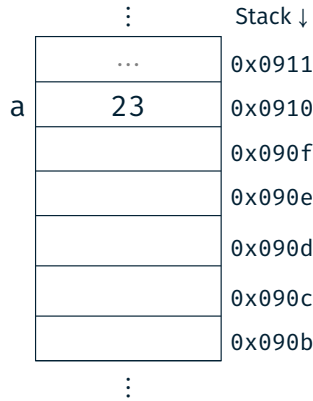




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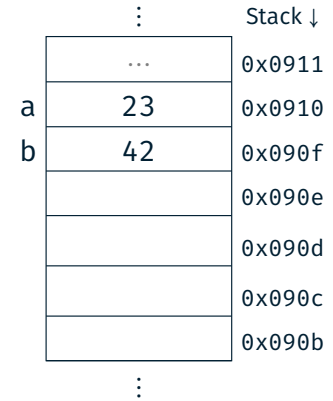


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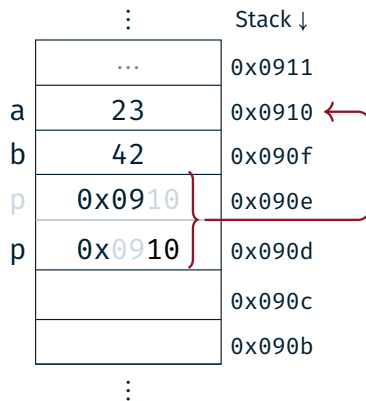
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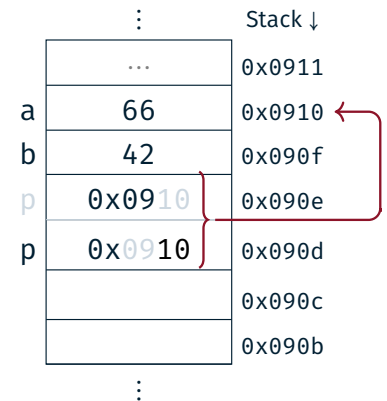


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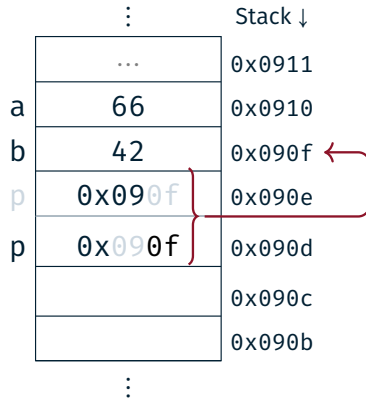
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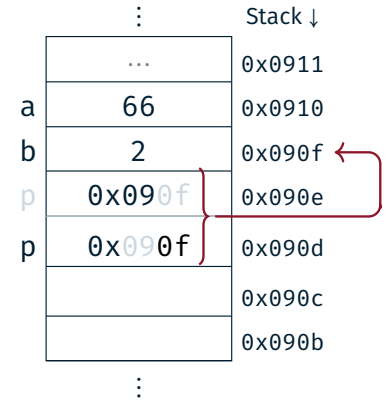


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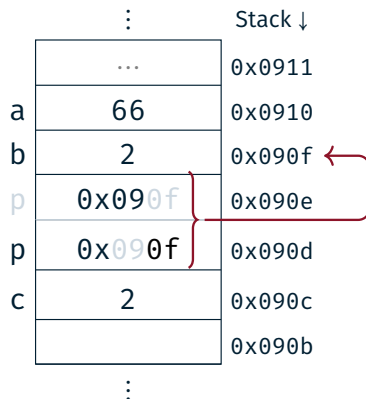
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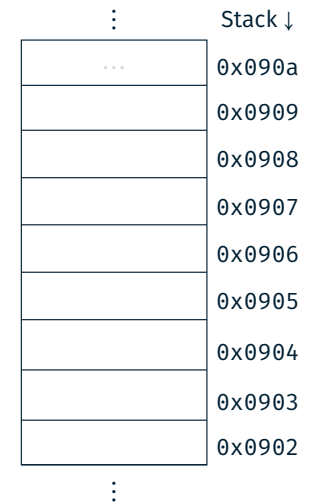


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08 uint8_t x[] = {2,4,8,16};
09 uint8_t *y = x;
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11 z = *y;
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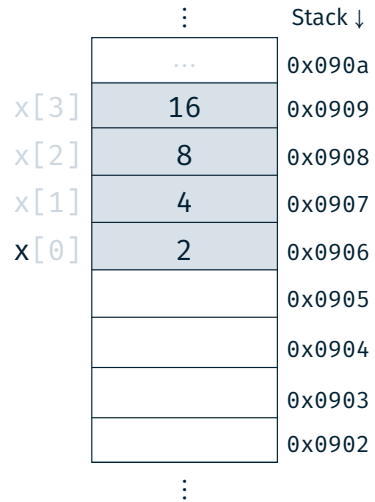




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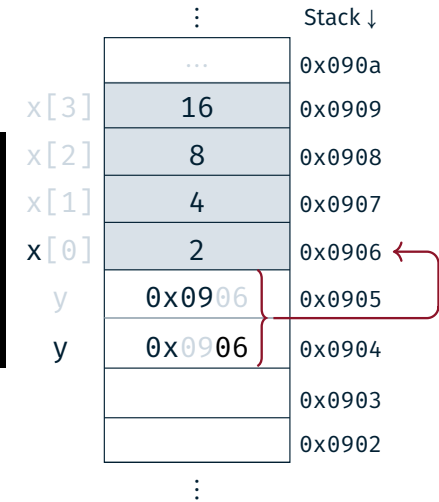
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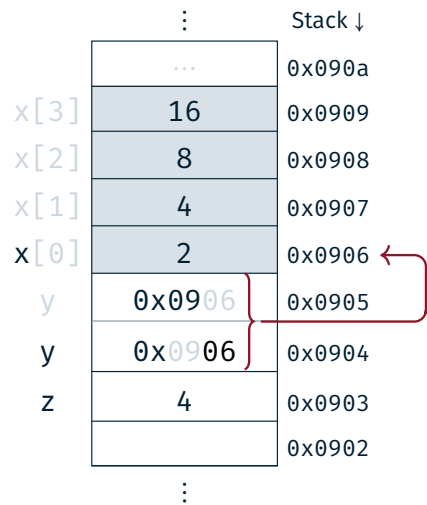
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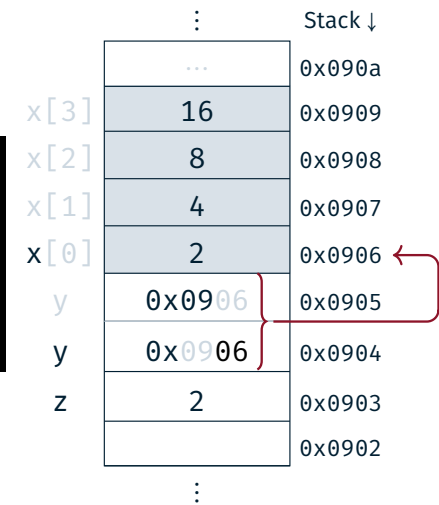
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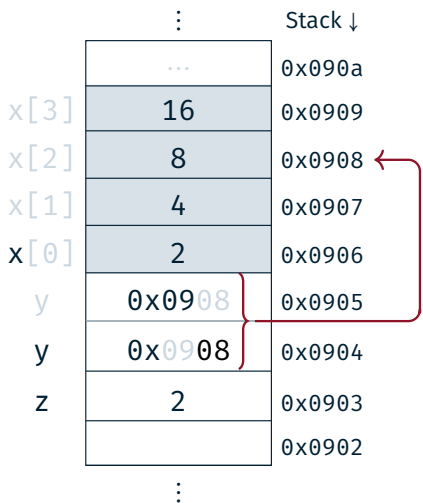


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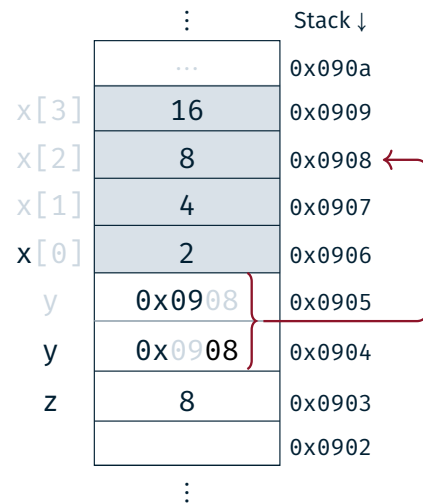


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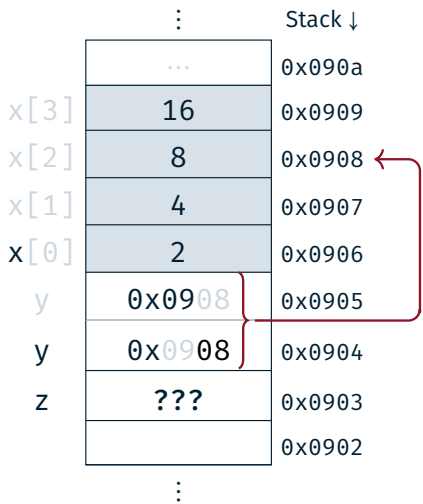


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# Hands-on: Zeiger

Kein Screencast



- 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>

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## Hands-on: Laufschrift

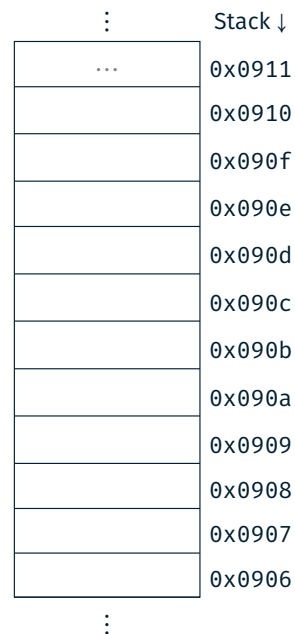
Screencast: <https://www.video.uni-erlangen.de/clip/id/18170>

## 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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01 char s[] = "World\n";
02 char c = s[0];
03 c = s[4];
04 char *s2 = s + 2;
05 c = s2[1];
```



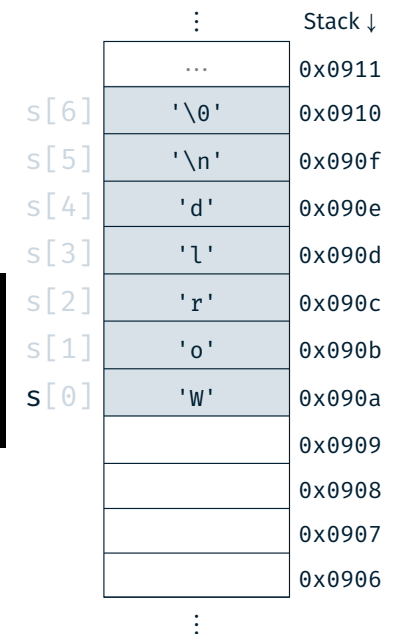
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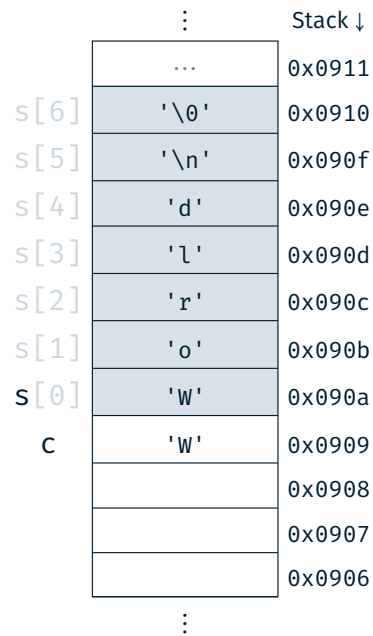


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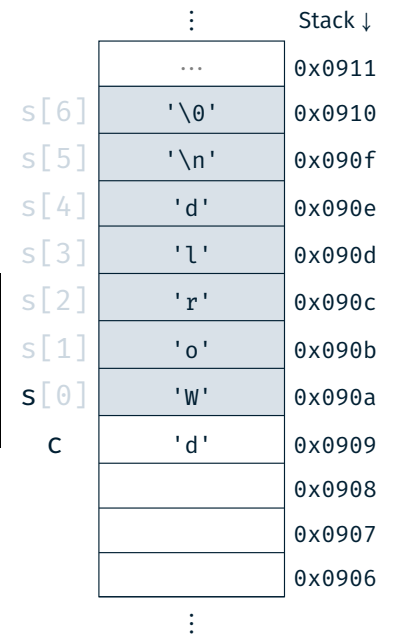
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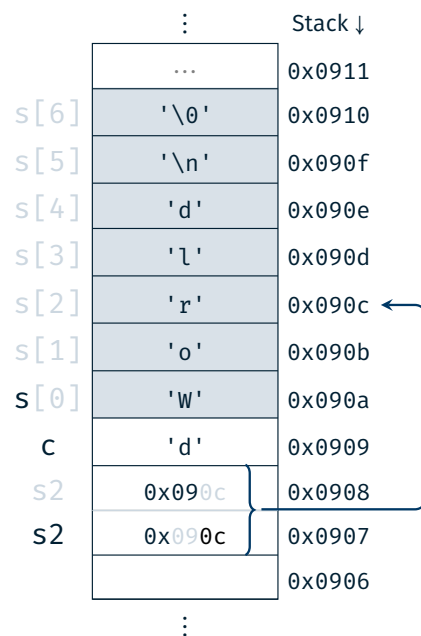
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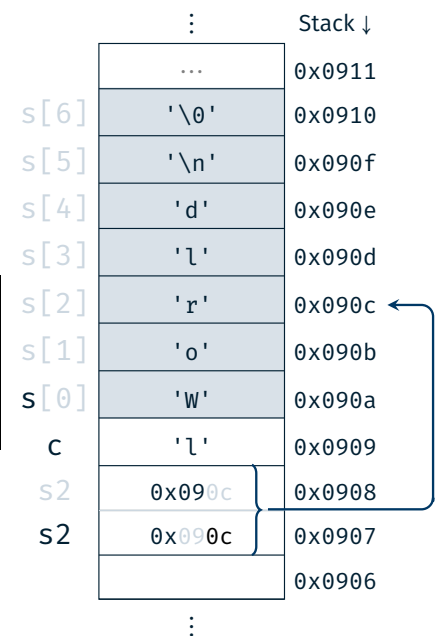
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- Funktionsweise:  
Schrittweises Anzeigen eines Textes auf der 7-Segment-Anzeige
- Lernziele:
  - Zeichenketten in C
  - Zeiger & Zeigerarithmetik
  - Alarme & Schlafenlegen
- Vorgehen:
  - Wiederkehrender Alarm mittels TIMER0
  - Zusammensetzen des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

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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 // [...]
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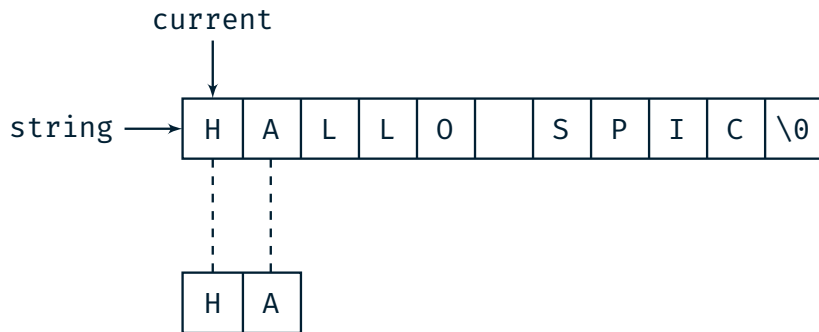
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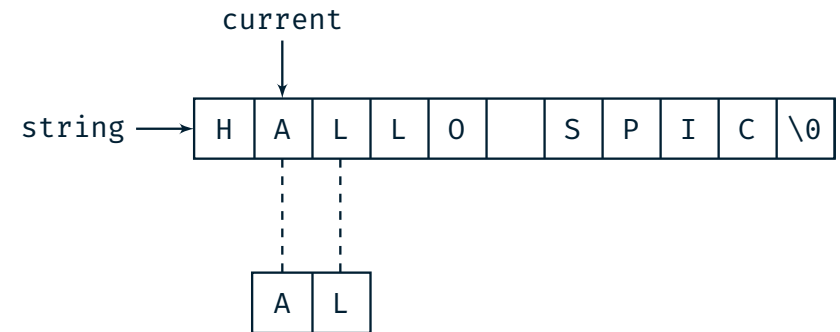
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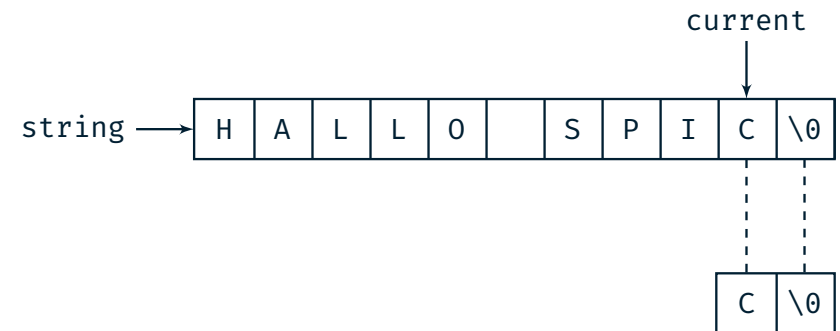
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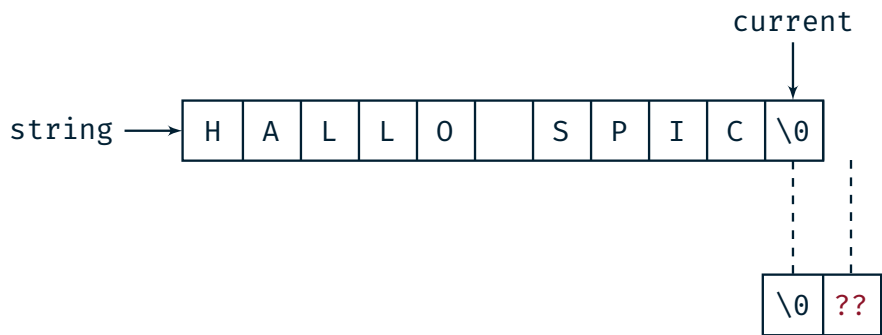




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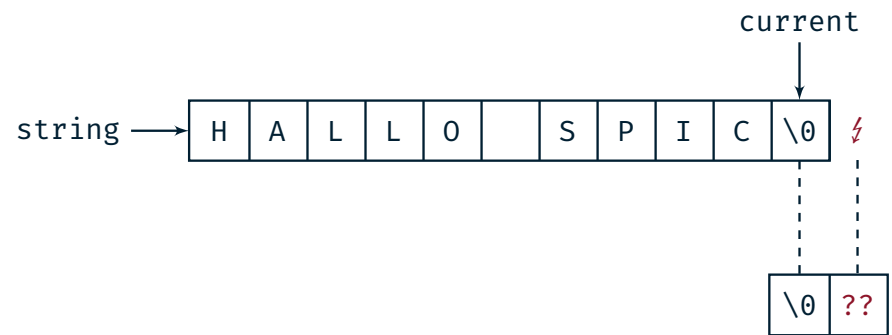


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