Übung zur Vorlesung Informatik I WS 2024/25
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Übungsgruppe 69

Abgabe des 4. Übungsblatts

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Aufgabe 29

Datei: temperatur.h

```c
#ifndef TEMPERATURE_H
#define TEMPERATURE_H

#include <stdio.h>
#include <stdlib.h>

#define MAX_CELSIUS -273.15
#define MIN_CELSIUS 100
#define SUCCESS 0
#define ERROR -1

#define CELSIUS_TO_FAHRENHEIT(celsius) ((celsius) *1.8 + 32)

void print_temp_in_fahrenheit(double *temperatures, int size);
int input_temperature(double *temperatures, int *size, int
    max_size);
int connect_temperature_arrays(double *temps1, int *temps1_size,
    int max_size, double *temps2, int temps2_size);

#endif
```

Datei: temperatur.c

```c
#include "temperature.h"

void print_temp_in_fahrenheit(double *temperatures, int  size) {
    int i;
    for (i = 0; i < size; i++) {
            printf("Temperatur %f C zu: %.2f F\n", temperatures[
                i], CELSIUS_TO_FAHRENHEIT(temperatures[i]));
    }
}

int input_temperature(double *temperatures, int *size, int
    max_size) {
    double input;

    if (*size >= max_size) {
            printf("Fehler: Maximale Kapazitaet des Arrays
                erreicht.\n");
```

```
            return ERROR;
        }

        printf("Geben Sie eine Temperatur in Grad Celsius ein (%d bis %.2f): ", MIN_CELSIUS, MAX_CELSIUS);

        if (scanf("%lf", &input) != 1 || input < MIN_CELSIUS || input > MAX_CELSIUS) {
            printf("Ungueltige Eingabe! Bitte eine gueltige Temperatur eingeben.\n");
            return ERROR;
        }

        temperatures[*size] = input;
        (*size)++;
        return SUCCESS;
}
int connect_temperature_arrays(double *temps1, int *temps1_size, int max_size, double *temps2, int temps2_size) {
    int i;

    if (*temps1_size + temps2_size > max_size) {
            printf("Fehler: Ziel-Array hat nicht genuegend Kapazitaet.\n");
            return ERROR;
        }

        for (i = 0; i < temps2_size; i++) {
            temps1[*temps1_size + i] = temps2[i];
        }

        *temps1_size += temps2_size;
        return SUCCESS;
}
```

Datei: 29main.c

```
#include "temperature.h"

int main(void) {
    int max_size = 10;
        double temperatures[10];
    int *size = 0;

    double second_temperatures[] = {25.5, -100.0};
    int second_size = 2;

        if (input_temperature(temperatures, size, max_size) == SUCCESS) {
            printf("Temperatur erfolgreich hinzugefuegt.\n");
        }

        printf("Alle Temperaturen in Fahrenheit:\n");
        print_temp_in_fahrenheit(temperatures, *size);

        if (connect_temperature_arrays(temperatures, size, max_size, second_temperatures, second_size) == SUCCESS)
```

```
            {
                printf("Arrays erfolgreich zusammengeführt.\n");
        } else {
        printf("Das 2. Array ist zu lang um es an das 1. Array
            anzufuegen!");
    }

        printf("Aktualisierte Temperaturen in Fahrenheit:\n");
        print_temp_in_fahrenheit(temperatures, *size);

    return 0;
}
```

Aufgabe 30

Datei: 30.h

```
#ifndef DREIZIG_H
#define DREIZIG_H

#include<stdio.h>

#define ISPRIME(x) printf("\nDIGAAAAA %i ist DIE Primzahl", x)
#define ABSTANT(a,b) (a > b) ? a - b : b - a

int prim(int a);
int quad(int q);

#endif
```

Datei: 30.c

```
#include "30.h"
#include<stdio.h>


int prim(int a){
    int i;
    for(i = 2; i * i <= a; i++){
        if(a % i  == 0){
            return 0;             /*flase*/
        }
    }
    return 1;                     /*true*/
}

int quad(int a){
    int i;
    for(i = 0; i < a; i++){
        if((i * i) == a){
            return 1;              /*true*/
        }
    }
    return 0;                      /*false*/
}

int main(void){
```

```
    int a, b, n;
    n = 0;

    for(a = 1000; a <= 1100; a++){
        if(prim(a)){
             ISPRIME(a);

            if(n > 0){
            printf("\nabstand zwischen %i und %i ist: %i", n, a,
                ABSTANT(a, n));
            }
        n = a;
        }

    }

    for(b = 1000; b <= 2000; b++){
        if(quad(b)){
            printf("\nBoa %i ist übelst die Quadrahtzahl", b);
        }

    }
    return 0;
}
```

Aufgabe 31

Datei: 31.c

```
#include <stdio.h>

unsigned long int fibonacci();
unsigned long int next(void);
void start(unsigned long int seed);

static unsigned long int current = 0;

int fibstop = 0;

int main () {
    static unsigned long int loops = 0;

    unsigned long int seed;
    int loopthreenplus1 = 0;

    static unsigned long int v1;
    static unsigned long int v2;
    static unsigned long int v3;

    fibstop = 50;

    fibonacci();

    printf("ab 48 unsigned long int limit reached. fib(48), fib
        (49) und fib(50) stimmen also nicht \n\n");

```

```
27      for (seed = 1; seed <= 10; seed++) {
28          printf("3n+1-Folge fuer: %i \n", seed);
29          start(seed);
30
31          v1 = 0;
32          v2 = 0;
33          v3 = 0;
34
35          while (1) {
36              if (loops == 0) {
37                  printf("%lu \n", current);
38              } else {
39                  printf("%lu \n", next());
40
41                  if (loopthreenplus1 % 3 == 0) {
42                      v1 = current;
43                      loopthreenplus1++;
44                  } else if (loopthreenplus1  % 3 == 1) {
45                      v2 = current;
46                      loopthreenplus1++;
47                  } else {
48                      v3 = current;
49                      loopthreenplus1 = 0;
50                  }
51              }
52
53              if ((v1 == 4 && v2 == 2 && v3 == 1) || (v1 == 1 && v2
                    == 4 && v3 == 2) || (v1 == 2 && v2 == 1 && v3 == 4)
                    ) {
54                  printf("4,2,1 loop reached \n\n");
55                  break;
56              }
57
58              loops++;
59          }
60          loops = 0;
61      }
62      return 0;
63  }
64
65  unsigned long int fibonacci(void) {
66      static unsigned long int last = 0, current = 0;
67      int n = 0, temp = 0;
68      while(n >= 0) {
69          if (n == fibstop + 1) {
70              return current;
71          } else if (n == 0) {
72
73          } else if (n == 1) {
74              current++;
75          } else {
76              temp = current;
77              current = last + current;
78              last = temp;
79          }
80          printf(" %i = %lu \n", n, current);
```

```
        n++;
    }
    return current;
}

void start(unsigned long int seed) {
    current = seed;
}

unsigned long int next(void) {
    if (current % 2 == 0) {
            current = current / 2;
    } else {
        current = 3 * current + 1;
    }
    return current;
}
```

Aufgabe 32

a

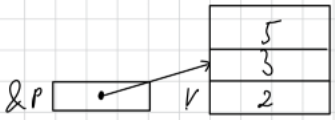
1. Datei: 32a1.c
```
int main(void){
    char w[3];
    int *p = &w[2];
}
```
2. Datei: 32a2.c
```
int main(void){
    int **p;
}
```
3. Datei: 32a3.c
```
int ** p;

int main(void){}
```
4. *v + 2 = 3
5. +(v + 2) = -1
6. Datei: 32a6.c
```
int main(void){
    int n;
    int *p = &n;
}
```
7. *(p++) = 6
8. ++(*p) = 7
9. *(++p) = 6
10. Mar
11. lade
12. ++(*p); -> (*p)++;
13. char w[] = v -> char w[strlen(v)]; strcpy(w, v);
14. *p = '5' -> p = '5'

15. *p = v -> *p = &v

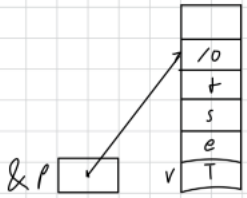
b)

32

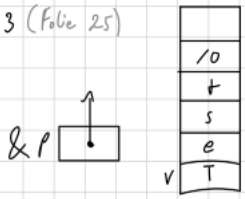
b) 1.



2.



3 (Folie 25)



c)

Anweisung	Typ
p = *a	char *

c)

Anweisung	Typ
p = *a	char *
p = a+1	char
p = &a	char *
p = **a	char **
p = a[0]	char
p = *a[0]	char *
p = &a[1]	char *