

Programmieren 1

Auditorium Exercise 8

Organisatorisches: Online Sprechstunden

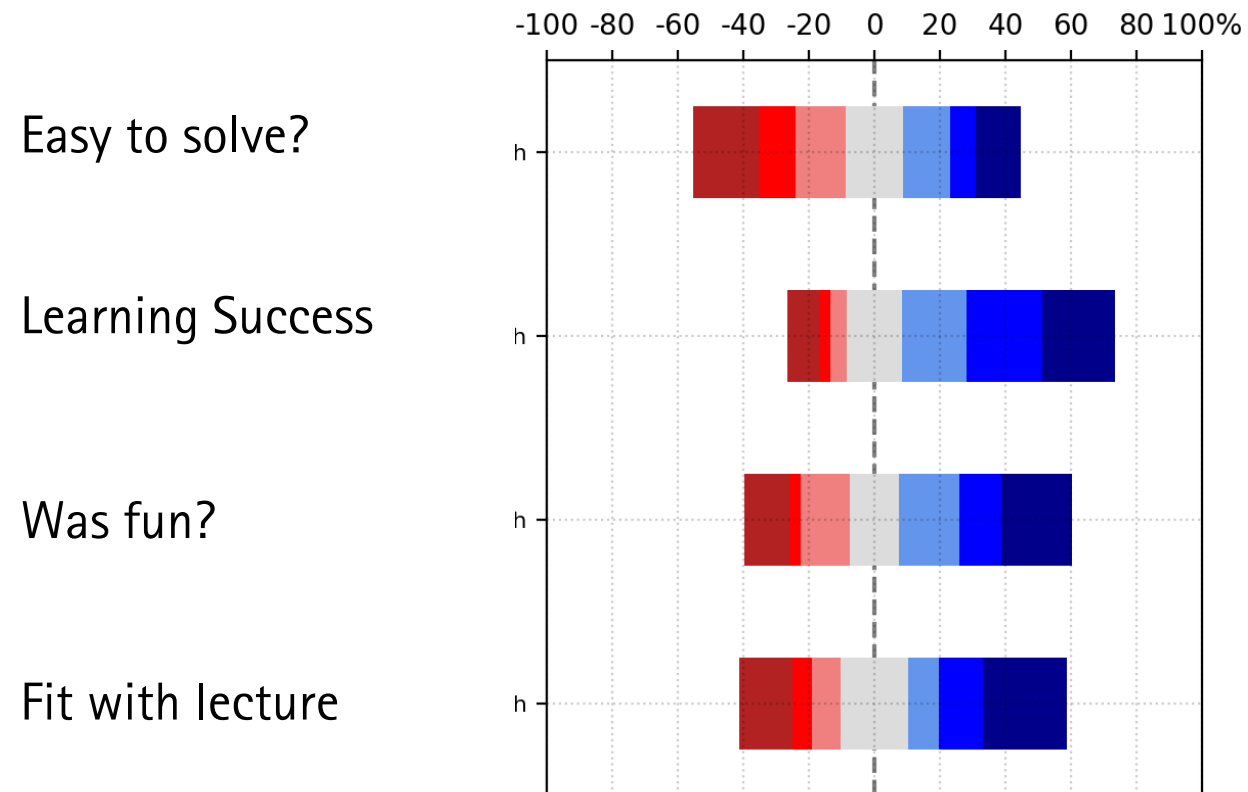
- Ähnlich zur LernLounge
 - Individuelle Hilfe bei Problemen mit Übungsaufgaben
 - Aufzeigen von Ansätzen
 - Keine Herausgabe von Lösungen
- Montags 18:00–20:00
- Mittwochs 17:00–19:00
- Donnerstags 17:00–19:00

Fragen?

ASSIGNMENT 7

Feedback – Assignment 3

DIVERGING stacked bar chart of qualitative results



Assignment 7

SURFACE

Surface of Geometric Shapes

- Main Structure: The Tagged Union Body

```
typedef struct GeomObject {  
    Tag tag;  
    union {  
        Cylinder cylinder;  
        Cuboid cuboid;  
        Sphere sphere;  
    };  
} GeomObject;
```

Creating a Geometric Shape

- Constructor Function for Cylinder
 - Same principle for the other two types

```
GeomObject make_cylinder(double r, double h) {  
    require("non-negative", r >= 0);  
    require("non-negative", h >= 0);  
    GeomObject o;  
    o.tag = TCylinder;  
    o.cylinder.r = r;  
    o.cylinder.h = h;  
    return o  
}
```


Calculating the Surface of a Body

```
double surface_area(GeomObject o) {
    double r, h, a, b, c;
    switch(o.tag) {
        case TSphere:
            return 4 * M_PI * o.sphere.r * o.sphere.r;
        case TCylinder:
            r = o.cylinder.r;
            h = o.cylinder.h;
            return 2 * M_PI * r * r + 2 * M_PI * r * h;
        case TSphere:
            a = o.cuboid.a;
            b = o.cuboid.b;
            c = o.cuboid.c;
            return 2 * a * b + 2 * a * c + 2 * b * c;
    }
    return -1;
}
```

Why even use Tagged Unions?

- Save Memory
- If a `Body` instance is a `Sphere`, there is no need to store the parameters of a `Cuboid`
- But: `sizeof(Body)` must be clearly defined
- The union is as large as its largest member (`Cuboid`)

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} GeomObject;
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Questions?

Assignment 8

- Already available on StudIP
- We will have a brief look inside now

Pointers & Arrays

LIVE SESSION