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```

Haskell Done Quick (03)

Lars Pfrenger | 07. Februar 2025

1. Stacks

Funktionsweise

Push

Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”

$\rightarrow$ Man nehmet/leget nur von “oben”

$\rightarrow$ Last In First Out (**LIFO**)

Funktionsweise

Push

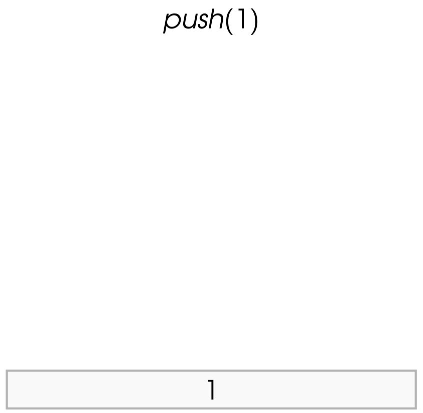
Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”

$\rightarrow$ Man nehmet/leget nur von “oben”

$\rightarrow$ Last In First Out (**LIFO**)



Funktionsweise

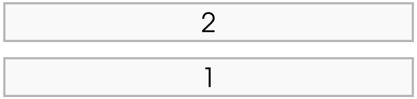
Push

Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”

push(2)



→ Man nehmet/leget nur von “oben”

→ Last In First Out (**LIFO**)

Funktionsweise

Push

Etwas auf den Stack “legen”

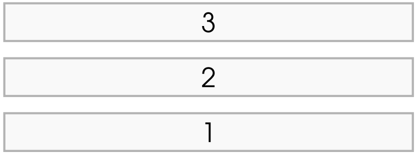
Pop

Etwas vom Stack “nehmen”

$\rightarrow$ Man nehmet/leget nur von “oben”

$\rightarrow$ Last In First Out (**LIFO**)

push(3)



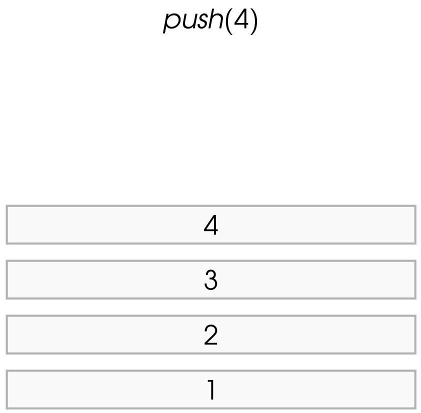
Funktionsweise

Push

Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”



→ Man nehmet/leget nur von “oben”

→ Last In First Out (**LIFO**)

Funktionsweise

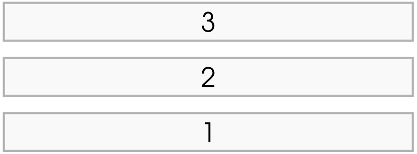
Push

Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”

$pop() \rightarrow 4$



$\rightarrow$ Man nehmet/leget nur von “oben”

$\rightarrow$ Last In First Out (**LIFO**)

Funktionsweise

Push

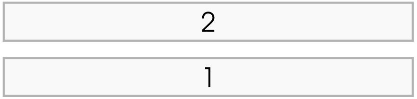
Etwas auf den Stack "legen"

Pop

Etwas vom Stack "nehmen"

→ Man nehmet/leget nur von "oben"
→ Last In First Out (**LIFO**)

$pop() \rightarrow 3$



Funktionsweise

Push

Etwas auf den Stack "legen"

Pop

Etwas vom Stack "nehmen"

$pop() \rightarrow 2$

$\rightarrow$ Man nehmet/leget nur von "oben"

$\rightarrow$ Last In First Out (**LIFO**)

Funktionsweise

Push

Etwas auf den Stack “legen”

Pop

Etwas vom Stack “nehmen”

$pop() \rightarrow 1$

→ Man nehmet/leget nur von “oben”

→ Last In First Out (**LIFO**)

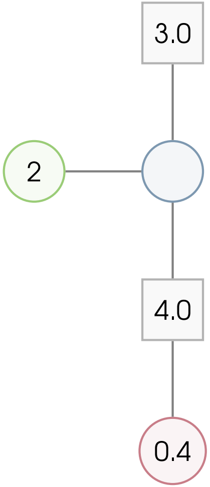
2. Baum Serialisieren

Baum (Darstellung)

```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```

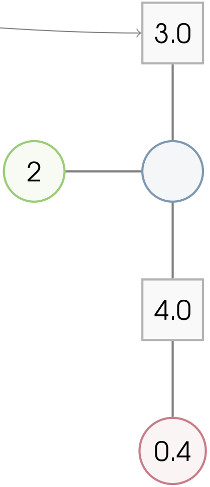
Baum (Darstellung)

```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```



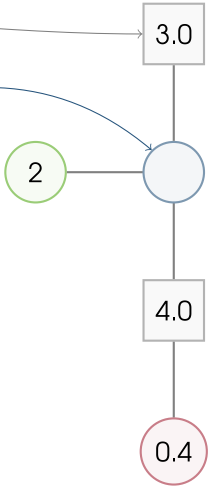
Baum (Darstellung)

```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```



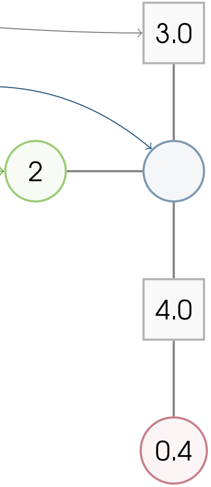
Baum (Darstellung)

```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```



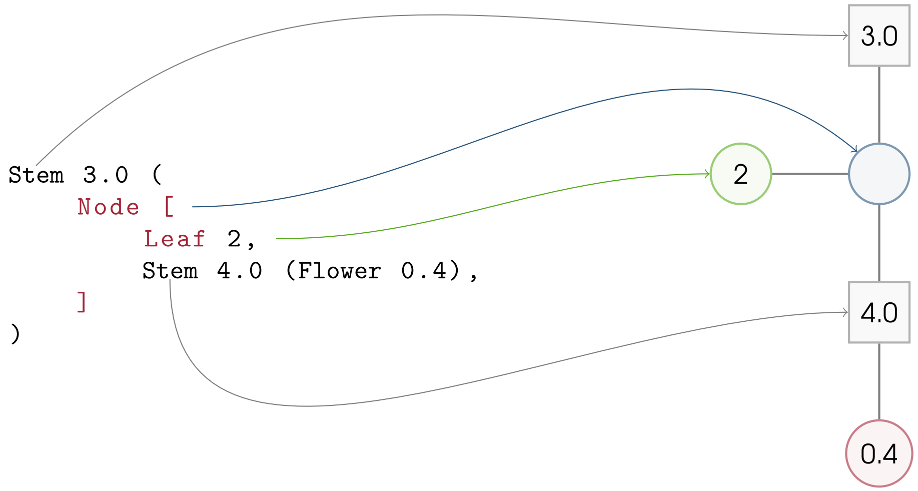
Baum (Darstellung)

```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```

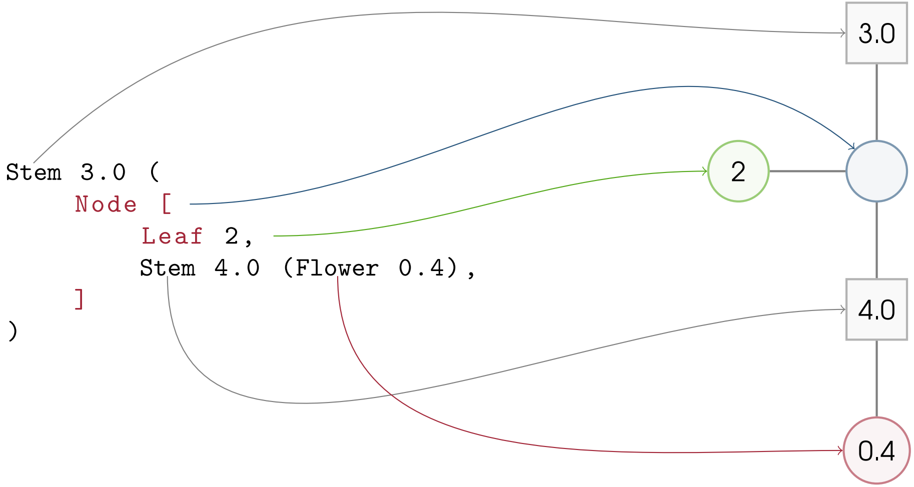


Baum (Darstellung)

```haskell
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```

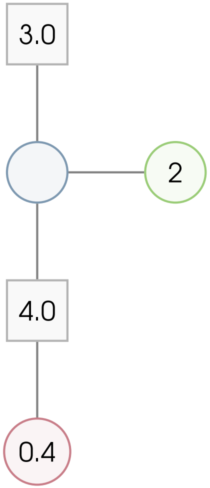


Baum (Darstellung)

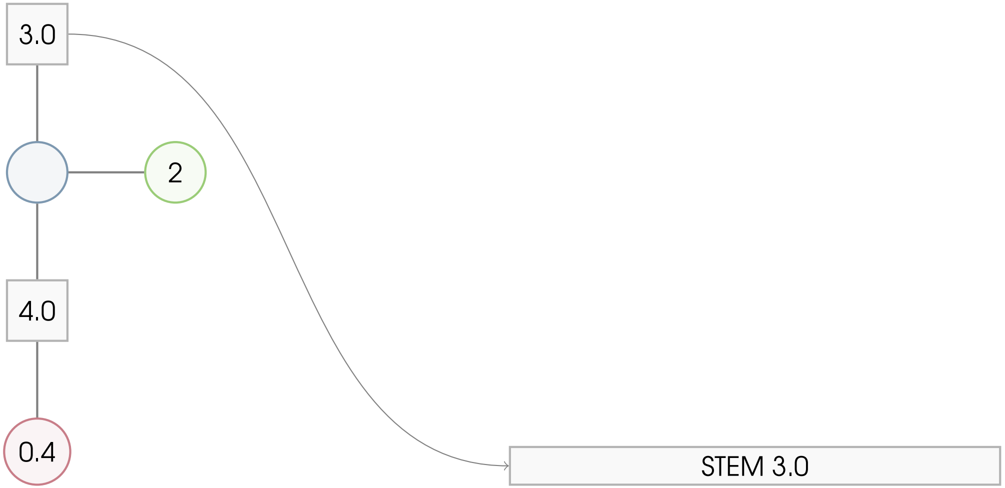


```
Stem 3.0 (
    Node [
        Leaf 2,
        Stem 4.0 (Flower 0.4),
    ]
)
```

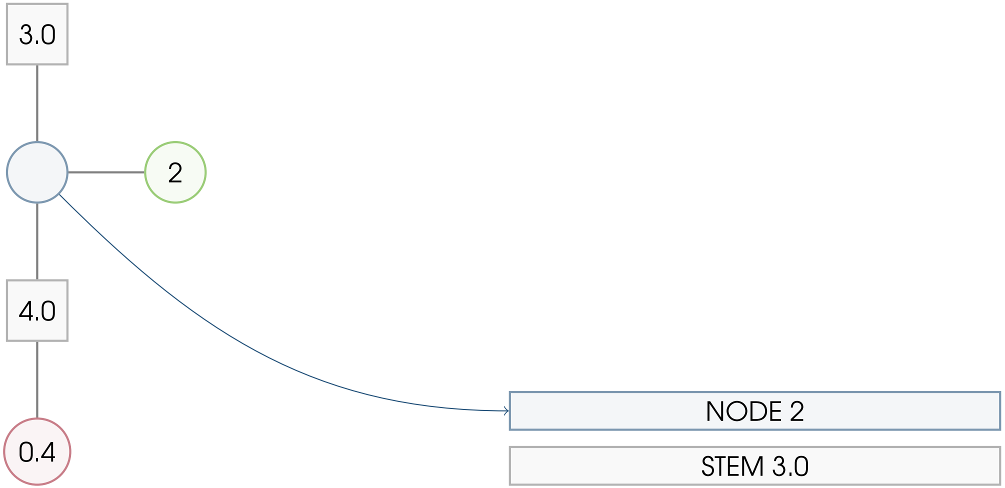
Baum zu Stack (Idee)



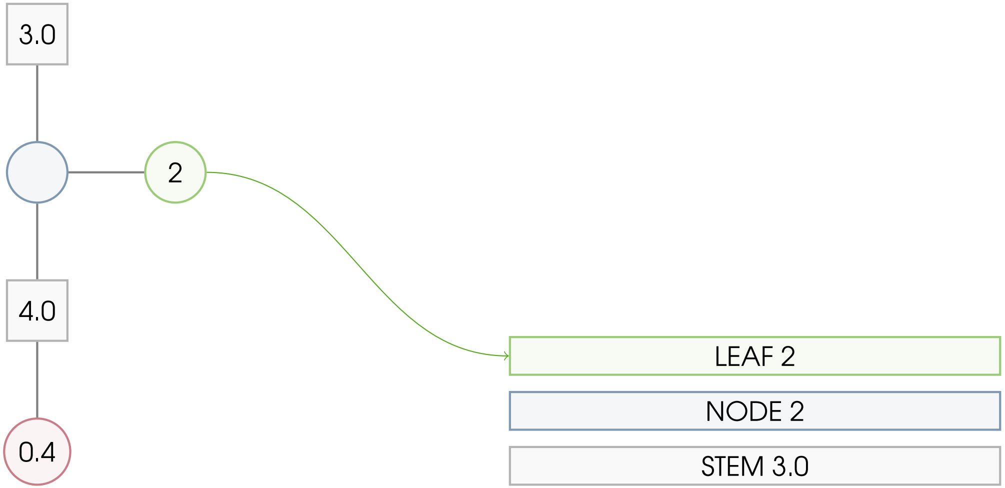
Baum zu Stack (Idee)



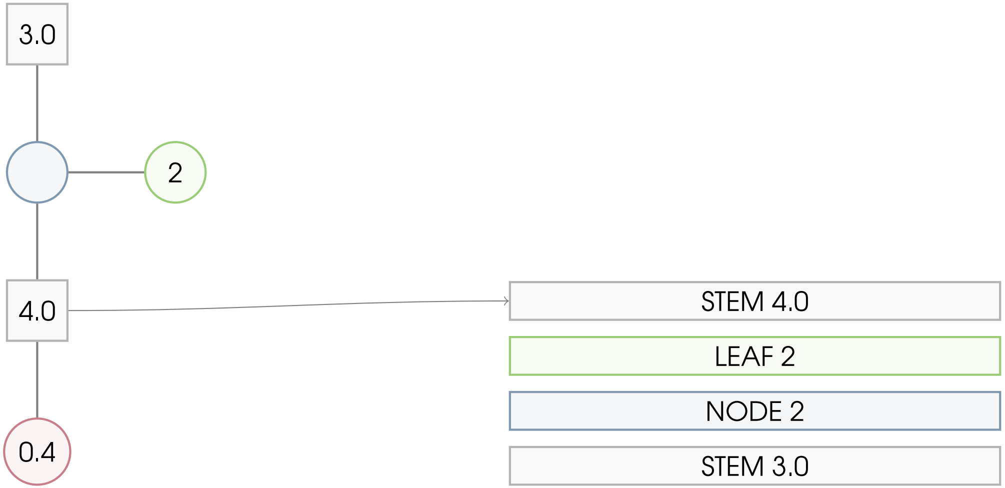
Baum zu Stack (Idee)



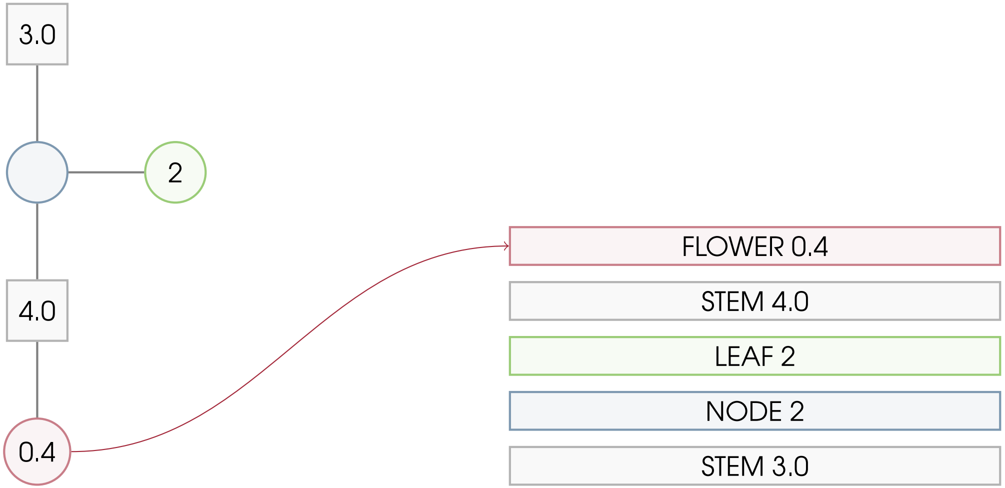
Baum zu Stack (Idee)



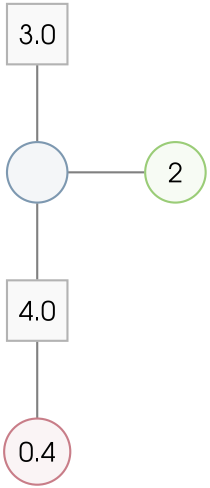
Baum zu Stack (Idee)



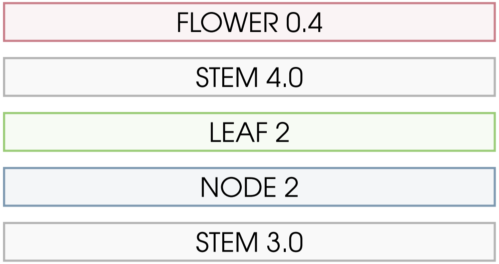
Baum zu Stack (Idee)



Baum zu Stack (Idee)



```
[FLOWER 0.4, STEM 4.0, LEAF 2, NODE 2, STEM 3.0]
```



Baum zu Stack (Code)

```haskell
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p ++ [STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

Baum zu Stack (Code)

```
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
 fLeaf (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p ++ [STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

Baum zu Stack (Code)

```
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
    (\a -> [LEAF a])
fFlower (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p ++ [STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

Baum zu Stack (Code)

```
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
 fFruit (\a -> [FRUIT a])
    (\s p -> p ++ [STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

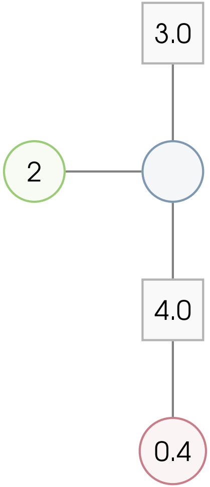
Baum zu Stack (Code)

```
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
fStem (\s p -> p ++ [STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

Baum zu Stack (Code)

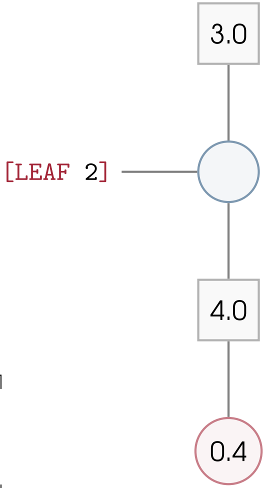
```
plantToStack :: Plant leaf flower fruit stem
    -> [StackPlant leaf flower fruit stem]

plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p ++ [STEM s])
fNode (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

What the fold doin? (post-order-traversal)



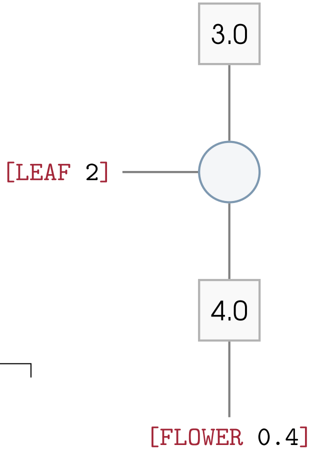
```
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps)++[NODE (length ps)])
```

What the fold doin? (post-order-traversal)



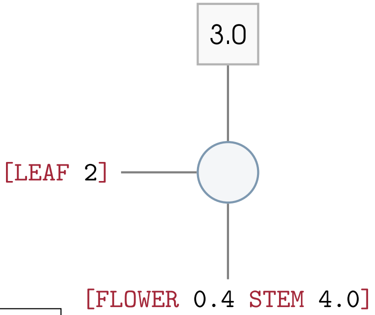
```
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps)++[NODE (length ps)])
```

What the fold doin? (post-order-traversal)



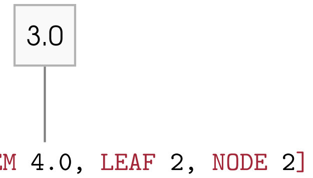
```
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps)++[NODE (length ps)])
```

What the fold doin? (post-order-traversal)



```
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps)++[NODE (length ps)])
```

What the fold doin? (post-order-traversal)



```
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps)++[NODE (length ps)])
```

What the fold doin? (post-order-traversal)

```
[FLOWER 0.4, STEM 4.0, LEAF 2, NODE 2, STEM 3.0]
```

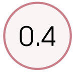
```haskell
plantToStack = foldPlant
    (\a -> [LEAF a])
    (\a -> [FLOWER a])
    (\a -> [FRUIT a])
    (\s p -> p++[STEM s])
    (\ps -> concat (reverse ps) ++ [NODE (length ps)])
```

Stack zu Baum (Idee)

```
[FLOWER 0.4, STEM 4.0, LEAF 2, NODE 2, STEM 3.0]
```

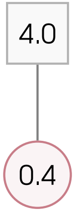
Stack zu Baum (Idee)

```
[STEM 4.0, LEAF 2, NODE 2, STEM 3.0]
```



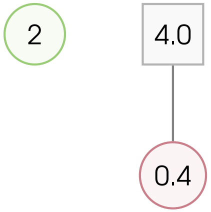
Stack zu Baum (Idee)

```
[LEAF 2, NODE 2, STEM 3.0]
```



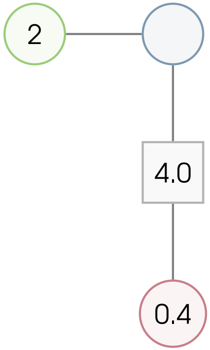
Stack zu Baum (Idee)

```
[NODE 2, STEM 3.0]
```



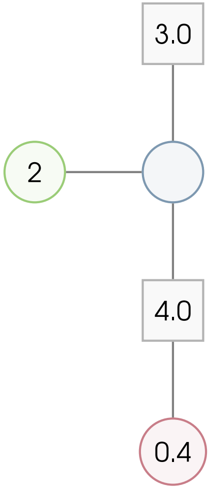
Stack zu Baum (Idee)

```
[STEM 3.0]
```



Stack zu Baum (Idee)

`[]`



Stack zu Baum (Code)

```
stackToPlants :: [StackPlant leaf flower fruit stem]
    -> [Plant leaf flower fruit stem]

stackToPlants = foldl
    (\ps c -> case c of
        LEAF l -> Leaf l : ps
        FLOWER f -> Flower f : ps
        FRUIT f -> Fruit f : ps
        STEM s -> Stem s (head ps) : tail ps
        NODE n -> Node (take n ps) : drop n ps)
    []
```

What the fold doin (the sequel)

```
[FLOWER 0.4, STEM 4.0,                 []
 LEAF 2, NODE 2, STEM 3.0]
```

What the fold doin (the sequel)

```
[STEM 4.0,
 LEAF 2, NODE 2, STEM 3.0]
```

```
[Flower 0.4]
```

What the fold doin (the sequel)

```
[LEAF 2, NODE 2, STEM 3.0]        [(Stem 4.0 (Flower 0.4))]
```

What the fold doin (the sequel)

```
[NODE 2, STEM 3.0]          [Leaf 2, (Stem 4.0 (Flower 0.4))]
```

What the fold doin (the sequel)

```
[STEM 3.0]          [(Node [Leaf 2, (Stem 4.0 (Flower 0.4))])]
```

What the fold doin (the sequel)

```
[]      [(Stem 3.0 (Node [Leaf 2, (Stem 4.0 (Flower 0.4))]))]
```