Mathematisch-Naturwissenschaftliche Fakultät

Programmiersprachen

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Object Meets Function

Assignment 5 – Winter Semester 22/23   Tübingen, 20. Januar 2023

Handin Please submit the homework until Sunday, January 29th 2023 via email to Steven Lolong (steven.lolong@uni-tuebingen.de) before 24:00.

Email Format Use this format for email's subject: **OmF-W22/23-Assign**[no]**-**[YourName]

File name Format Use this format for file name **Assig-**[no]-[Your Name]

Task 1: Parametric Type on Binary Tree (12 Points)
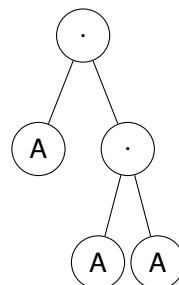
Tree from previous assignment

Abbildung 1: **A = Parametric type**

1.1 Operation on Binary Tree (6 Points)

Regarding the tree above, implementing operations for every type requires a lot of work. So, to avoid too much work for every type, please write the map function, filter function, and fold function for your binary tree.

1. The map function (2 points).

2. The filter function, for this function, rather than create a new tree structure, you only need to delete the content of the leaf with the id of the type (where the id is a part of the function parameter). (2 points)

3. The fold function (2 points)

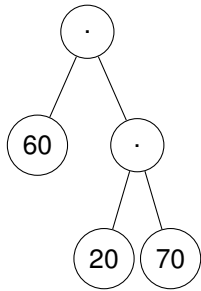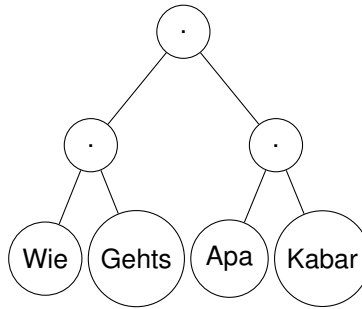## 1.2 Proof of Functions (6 Points)

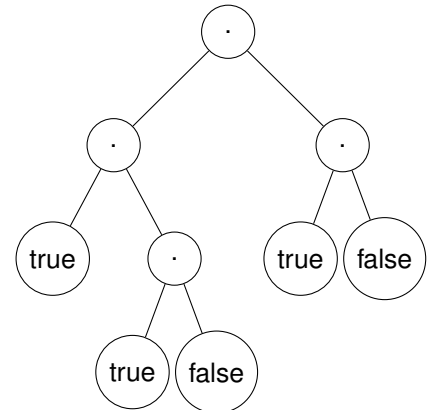Abbildung 2: **BT-Integer**

Abbildung 3: **BT-String**

Abbildung 4: **BT-Boolean**

1. Please sum abbildung 2: BT-Integer using fold function, the result is150. (2 points)

2. Using filter function, please choose only 'Wie' (abbildung 3: BT-String) will stay in the leaf other than that will replace by id (id of string is empty string). (2 points)

3. Please change all false to true (see abbildung 4: BT-Boolean). Rather than check and replace, please using map function to apply on it with or (partial or with true, ex: $\_ \ || \ true$). (2 points)