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## Structure of hierarchical structures

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# STRUCTURE OF HIERARCHICAL STRUCTURES WITHIN A SPREADSHEET PROGRAM

## Technical task:

The task of the technical innovation is to set high numbers of selected hierarchies in a program-supported structure.

## Initial situation:

A spreadsheet program (such as Microsoft Excel) works with two-dimensional tables that have rows and columns. The representation of hierarchical structures - in the graph theory of computer science called „tree“ - can pictorially presented in a two-dimensional table according to different patterns. Each of the representation patterns shown in the pattern patterns 1-3 Hierarchy has its specific advantages.

The spreadsheet program „Excel“ enables the opening and closing of partial branches of a hierarchical tree via a so-called „structure“.

In Fig. 4, the outline levels 1-4 are shown on the left. The node marked as „+“ is collapsed and can be opened with a mouse click.

Furthermore, by clicking on an outline level (1-4), all the structures below it in the hierarchy can be collapsed.

The structure of an outline structure can currently only be created manually.

## Solution:

-Especially in the case of complex data structures, it is possible to generate an overview using the program structure available.

-The described function for the automatic generation of the structure from a marked hierarchical representation represents an enormous effort saving.

-An example is the spreadsheet Excel, which is very popular for the analysis of larger databases. If several hundred or a multiple of hierarchical data are brought here for processing or processing, a manual arrangement of the structure is hardly conceivable.

## Advantages:

- Hierarchy in columns, suitable for the manual creation of a hierarchical structure
- Hierarchy in full path columns for location in the graph suitable for e.g. Existing filter function in Excel. With this, partial branches of the hierarchical tree can be displayed in stages filtered in individual columns. For explanation, the following example (Fig. 4) is given. On the left is the unfiltered representation. Right is in the column with the headline
- Hierarchy in a column with cell entries, this representation of the hierarchy is compact and has the additional advantage of searching for or restricting the structure entry via only one filter of a column.
- An example is the spreadsheet Excel, which is very popular for the analysis of larger databases. If several hundred or many times hierarchical data are brought here for processing or processing, the conversion into the different representation patterns is a great advantage.

## Possible application:

- Applicable in spreadsheet programs.

### Stand der Technik

Darstellungsmuster 1: Hierarchie in Spalten

	A	B	C	D	E
1					
2					
3		Wurzel			
4			Knoten-1		
5				Blatt-1-1	
6				Blatt-1-2	
7			Knoten-2		
8				Blatt-2-1	
9			Knoten-3		
10				Knoten-3-1	
11					Blatt-3-1-1
12					Blatt-3-1-2
13			Blatt-4		
14					

Darstellungsmuster 2: Hierarchie in Spalten mit vollständiger Pfadangabe zur Verortung im Graph

	A	B	C	D	E
1					
2					
3		Wurzel			
4		Wurzel	Knoten-1		
5		Wurzel	Knoten-1	Blatt-1-1	
6		Wurzel	Knoten-1	Blatt-1-2	
7		Wurzel	Knoten-2		
8		Wurzel	Knoten-2	Blatt-2-1	
9		Wurzel	Knoten-3		
10		Wurzel	Knoten-3	Knoten-3-1	
11		Wurzel	Knoten-3	Knoten-3-1	Blatt-3-1-1
12		Wurzel	Knoten-3	Knoten-3-1	Blatt-3-1-2
13		Wurzel	Blatt-4		
14					

Darstellungsmuster 3: Hierarchie in einer Spalte mit Zelleinträge

	A	B	C
1			
2			
3		Wurzel	
4		Knoten-1	
5		Blatt-1-1	
6		Blatt-1-2	
7		Knoten-2	
8		Blatt-2-1	
9		Knoten-3	
10		Knoten-3-1	
11		Blatt-3-1-1	
12		Blatt-3-1-2	
13		Blatt-4	
14			

Die Anlage einer Gliederung (oder auch Gruppierung) erfolgt je Teil-Ast manuell.

	A	B	C	D	E
1					
2					
3		Wurzel			
4		Wurzel	Knoten-1		
7		Wurzel	Knoten-2		
8		Wurzel	Knoten-2	Blatt-2-1	
9		Wurzel	Knoten-3		
10		Wurzel	Knoten-3	Knoten-3-1	
11		Wurzel	Knoten-3	Knoten-3-1	Blatt-3-1-1
12		Wurzel	Knoten-3	Knoten-3-1	Blatt-3-1-2
13		Wurzel	Blatt-4		
14					

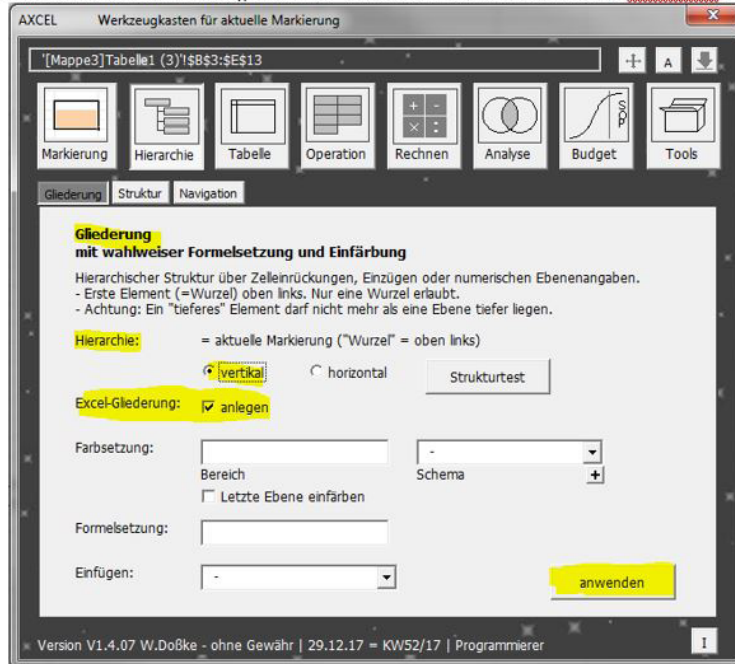
## Technische Neuerung

## Beispielablauf:

a) Markierung der hierarchischen Struktur auf einem Tabellenblatt

	A	B	C	D	E
1					
2					
3		Wurzel			
4			Knoten-1		
5				Blatt-1-1	
6				Blatt-1-2	
7			Knoten-2		
8				Blatt-2-1	
9			Knoten-3		
10				Knoten-3-1	
11					Blatt-3-1-1
12					Blatt-3-1-2
13			Blatt-4		
14					

b) Aufruf innerhalb Tool „AXCEL“ mit der Tastenkombination STRG+d:



Die hierarchische Struktur wird erkannt und eine Gliederung aufgebaut (s. Ergebnisdarstellung).

## Technische Neuerung

c) Ergebnisdarstellung mit linksseitiger Gliederung

	A	B	C	D	E
1					
2					
3		Wurzel			
4			Knoten-1		
5				Blatt-1-1	
6				Blatt-1-2	
7			Knoten-2		
8				Blatt-2-1	
9			Knoten-3		
10				Knoten-3-1	
11					Blatt-3-1-1
12					Blatt-3-1-2
13			Blatt-4		
14					

Alternativ kann auch für eine horizontale hierarchische Struktur eine Gliederung erzeugt werden:

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2												
3		Wurzel										
4			Knoten-1			Knoten-2		Knoten-3				Blatt-4
5				Blatt-1-1	Blatt-1-2		Blatt-2-1			Knoten-3-1		
6										Blatt-3-1-1	Blatt-3-1-2	
7												