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GNU command line tools for code analysis

Bugsquashing Seminars
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IN THE HELMHOLTZ ASSOCIATION



50 Years – Research for
A Life Without Cancer

DEPRECATE(D) Macros

Problems:

- Deprecated methods are extensively used

```
DEPRECATED(·MITKCORE_EXPORT bool·Equal(·mitk::Surface*·leftHandSide,·mitk::Surface*·rightHandSide,·m
```

- Inconsistencies between code and doxygen

```
·*·\deprecated·use·GetData()->GetGeometry()->GetVtkTransform()·instead  
·*/  
vtkLinearTransform*·GetVtkTransform(int·t=0)·const;
```

Goals:

- Estimate effect of removing deprecated methods
- Find differences between code and doxygen

Example 1

mitk::Image defines a deprecated Method **GetData()**

```
·/** @brief Get the data vector of the complete image, i.e., of all channels linked  
·  
·If you only want to access a slice, volume at a specific time or single channel  
·use one of the SubImageSelector classes.  
·\deprecatedSince{2012_09} Please use image accessors instead: See Doxygen/Related  
·DEPRECATED(virtual void* GetData());
```

“Git grep” is not very helpful (e.g. mitk::DataNode)

```
/**  
·* \brief Get the data object (instance of BaseData, e.g., an Image)  
·* managed by this DataNode  
·*/  
BaseData* GetData() const;
```

Approach

- Remove deprecated method or make it private
- Ignore errors during compilation

‘`make -k`’ will continue compiling other object files even though it already knows that linking them will be impossible

https://www.gnu.org/software/make/manual/html_node/Testing.html

```
make -k 2> errors.txt
```

- Find errors

```
grep 'within this context' errors.txt
```

Where do the errors occur?

- In each line: delete text after the filename, separated by ‘:’

```
sed s/:.*$// errors.txt > sed.txt
```

- Count occurrence of consecutive duplicates
→ Represents number of usages per file

```
uniq -c sed.txt
```

```
2 mbi/Modules/ToFCalibrationMBI/Algorithms/mitkUndistortImageFilter.cpp
1 mbi/Modules/ToFCalibrationMBI/Common/mitkToFCalibrationCommon.cpp
7 mbi/Modules/ToFCalibrationMBI/Deprecated/mitkTOOpticsCalibration.cpp
12 mbi/Modules/ToFCalibrationMBI/MiniApps/AmplCalibrationDataToEvaluationFile.cpp
6 mbi/Modules/ToFCalibrationMBI/MiniApps/CalibrationDataToCSV.cpp
8 mbi/Modules/ToFCalibrationMBI/MiniApps/CalibrationDataToEvaluationFile.cpp
1 mbi/Modules/ToFCalibrationMBI/UI/QmitkDTDCalibrationWidget.cpp
```

Sed is a Stream-Editor

- Unix tool to parse and transform text
- Powerful: Turing-complete language scope
- Example for replacing text

```
sed 's/regexp/replacement/g' inFile > outFile
```

Uniq removes duplicates

‘**uniq**’ outputs the file with adjacent identical lines collapsed to one

<https://http://en.wikipedia.org/wiki/Uniq>

Example 2

- Find differences between doxygen and code

See example 1

```
git grep deprecatedSince | sed s/:.*$// | uniq -c  
> deprSince.txt
```

```
git grep DEPRECATED | sed s/:.*$// | uniq -c  
> DEPRECATED.txt
```

```
sort -f -k 2 deprSince.txt > deprSinceSorted.txt
```

```
sort -f -k 2 DEPRECATED.txt > DEPRECATEDSorted.txt
```

```
join -a1 -a2 -1 2 -2 2 -o 0 1.1 2.1 -e "0"  
DEPRECATEDSorted.txt deprSinceSorted.txt  
> deprecatedDEPRECATED.txt
```

Result

Anzahl Vorkommnisse der folgenden Pattern nach Dateiname: -->			DEPRECATED
			deprecatedSince
			Differenz
Modules/ContourModel/Algorithms/mitkContourObjectFactory.h	1	1	0
Modules/ContourModel/IO/mitkContourModelWriter.h	2	1	1
Modules/Core/CMakeLists.txt	2	0	2
Modules/Core/include/mitkBaseData.h	3	3	0
Modules/Core/include/mitkBaseGeometry.h	3	0	3
Modules/Core/include/mitkBaseProcess.h	1	0	1
Modules/Core/include/mitkBaseRenderer.h	7	6	1
Modules/Core/include/mitkCommon.h	6	0	6
Modules/Core/include/mitkCoreObjectFactoryBase.h	0	6	-6
Modules/Core/include/mitkCoreObjectFactory.h	6	9	-3
Modules/Core/include/mitkDataNode.h	0	2	-2
Modules/Core/include/mitkDisplayGeometry.h	1	0	1
Modules/Core/include/mitkDisplayPositionEvent.h	0	1	-1
Modules/Core/include/mitkEventDescription.h	0	1	-1
Modules/Core/include/mitkEvent.h	0	1	-1
Modules/Core/include/mitkEventMapper.h	0	1	-1
Modules/Core/include/mitkEventStateMachine.h	3	1	2
Modules/Core/include/mitkFileReader.h	0	1	-1
Modules/Core/include/mitkFileWriter.h	0	1	-1
Modules/Core/include/mitkFileWriterWithInformation.h	0	1	-1
Modules/Core/include/mitkGlobalInteraction.h	0	1	-1
Modules/Core/include/mitkIDataNodeReader.h	0	1	-1
Modules/Core/include/mitkImageDataItem.h	1	1	0
Modules/Core/include/mitkImage.h	30	4	26
Modules/Core/include/mitkImageVtkAccessor.h	1	1	0
Modules/Core/include/mitkInteractor.h	0	1	-1
Modules/Core/include/mitkIOAdapter.h	0	2	-2

A photograph of the German Cancer Research Center (DKFZ) building, a modern multi-story structure with a central tower and glass facades. The building is set against a blue sky with scattered white clouds. In the foreground, there is a paved courtyard with several water fountains spraying upwards. Orange benches are arranged around the courtyard. The DKFZ logo is visible on the top of the central tower.

**Thank you
for your
attention!**

dkfz.

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