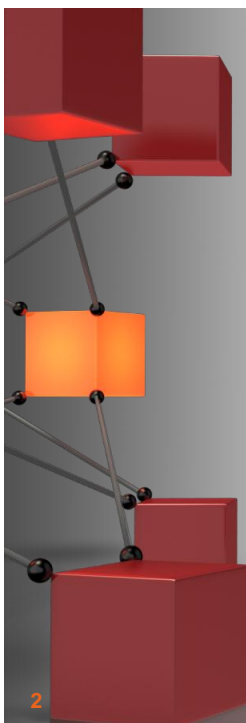# Code Documentation & Doxygen
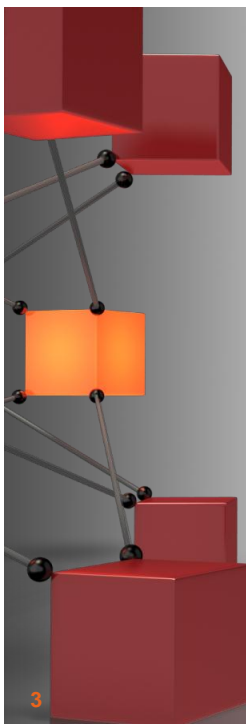
COS 121 – Christoph Stallmann

Introduction

- Written text and diagrams that accompanies your source code or software:

  - Explains how the code works

  - Explains how to use the code

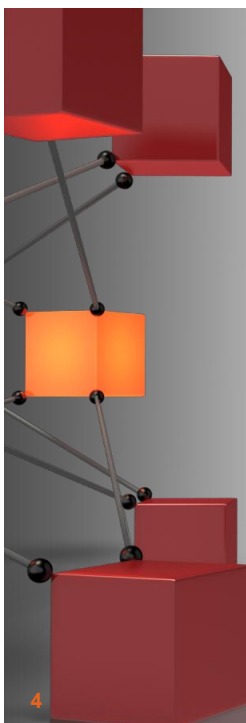 - Explains how to use the software

2

Introduction

- Means different things to different people:

  - User manual for software users

  - UML diagrams for software modellers
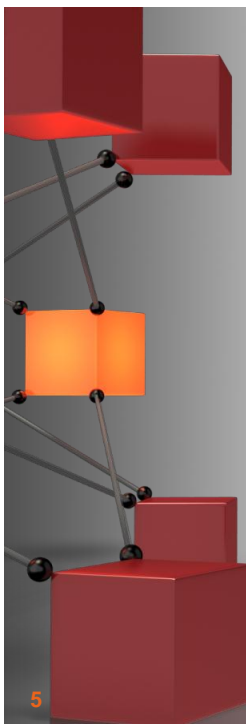
  - API documentation for coders

3

Reason

- Why bother?

  - Helps you when you didn't work on a piece of code for a while.

  - Helps colleagues and team members with your implementation.
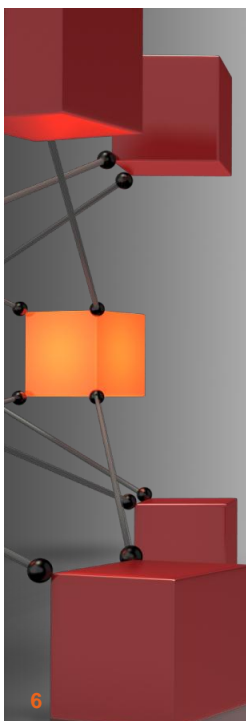
 - Future coders might need to extend your code.

4

Reason

- Why bother?

    - Third parties might use your code.

    - Used for internal and external quality checks.

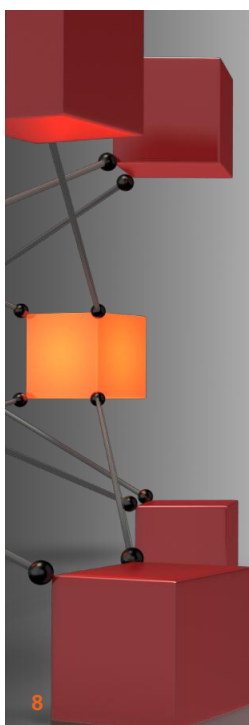   - Proof of contract that certain things were implemented.

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Types

- Requirements documentation:
    - States what the system should do.
    - States what the client wants.
- Architecture and Design documentation:
    - States how the system should be implemented.
- Technical documentation:
    - Description of code, algorithms, libraries and APIs.
- End-user documentation:
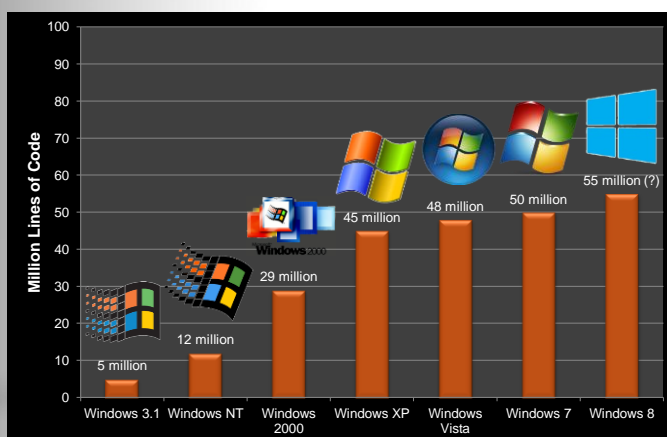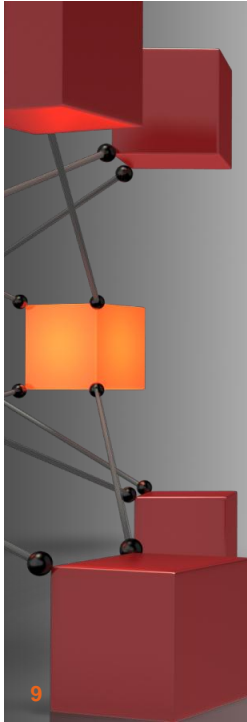   - Manuals and tutorials on how to use the system.

6

Types

- Requirements documentation:
    - States what the system should do.
    - States what the client wants.
- Architecture and Design documentation:
    - States how the system should be implemented.
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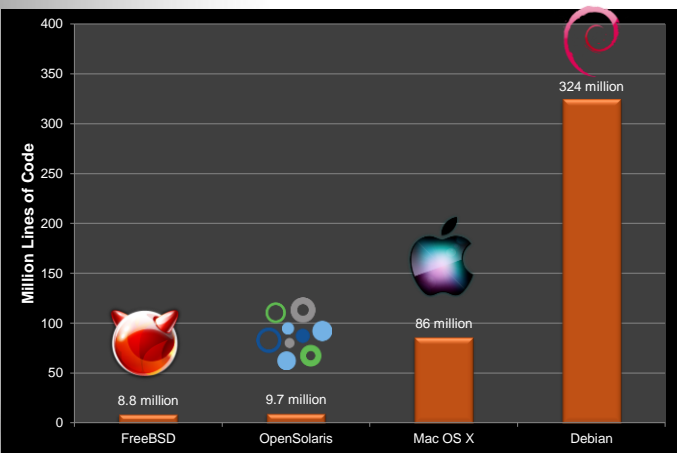   - Manuals and tutorials on how to use the system.
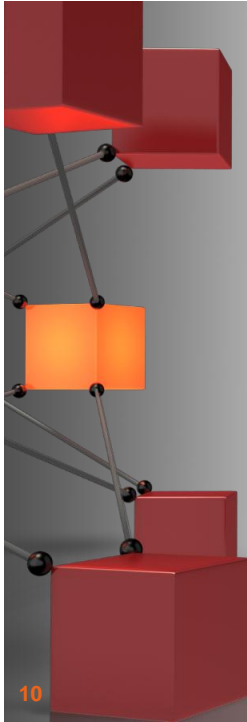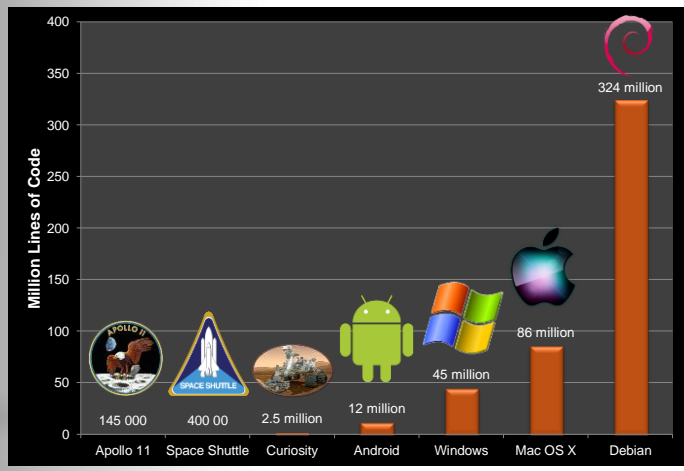
7
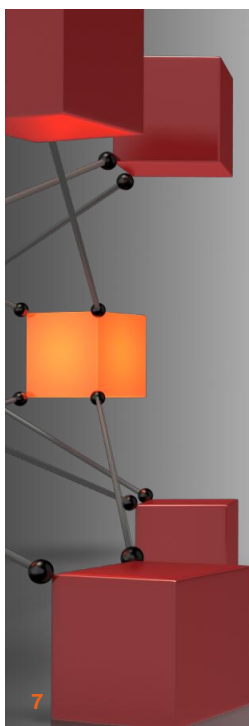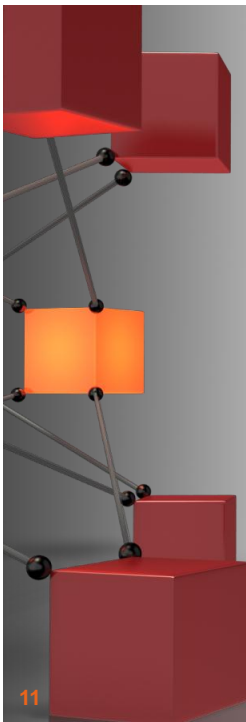
Statistics - Windows

8

Statistics - Unix

Statistics - Comparison

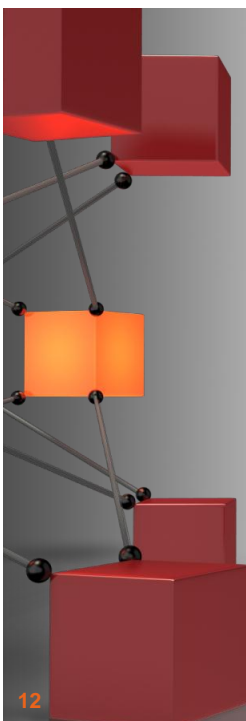## Statistics

- South Africa is the 83rd (from 194) richest (poorest) countries in the world.
  - That is in the middle.

- The president of SA is the 8th highest paid politician in the world.
  - Before Russia, China, UK and Australia.
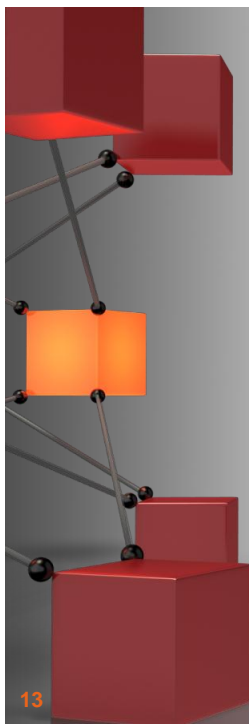
- Jacob Zuma earns about R2.7 million per annum.

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Statistics

- Ohloh estimates it will cost $8 billion to develop 324 million lines of code.

- Therefore to develop Debian, it will take Zuma's entire salary for:
  - 27 000 000 000 years
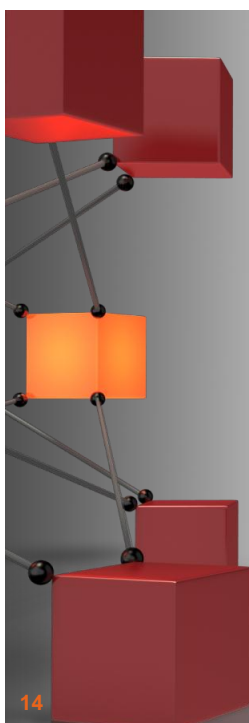 - 27 billion years
  - 6 times longer than the earth exists

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Statistics

- A productive programmer writes about 1000 lines of code per day.

- Therefore to develop Debian it will take a single programmer:
  - 324 000 days.
  - 1350 years (on an average working-week).
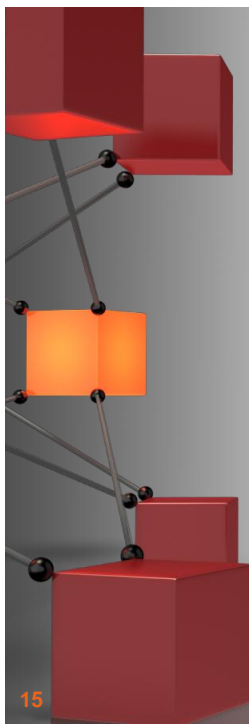 - This excludes documentation, planning, design and testing.

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Statistics - Documentation

- Microsoft's MSDN Library (English) documentation has:
  - 3 154 289 topics

- With 3 pages per topic, 40 lines per page
  - 380 million lines of documentation
  - 8 times more documentation than code in Windows.
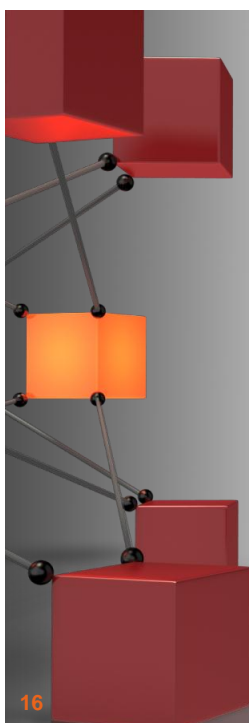
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Doxygen

- Documentation generator
  - Standards for documenting code
  - Tools for converting code into different formats

- Supports many programming languages:
  - C++
  - C#
  - Java
  - PHP
  - Python
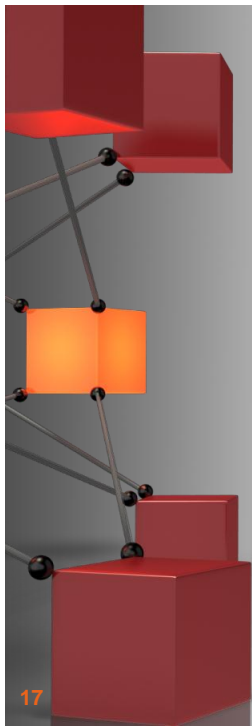 - Many more …

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Doxygen

- http://www.doxygen.org

- Free of charge:
  - Open source
  - GNU General Public License (GPL)

- Written in C++

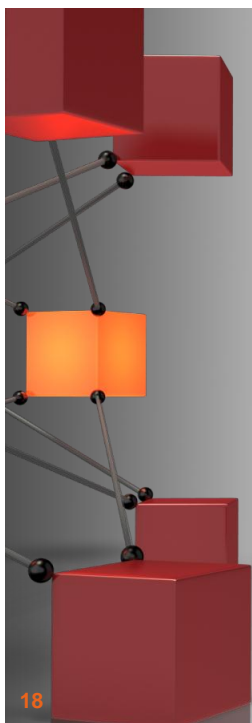- Release:
  - Initial: October 1997
  - Latest: August 2012

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Doxygen Installation

- Ubuntu:
  - 413 MB
  - sudo apt-get install doxygen doxygen-gui
  - Start GUI with terminal command: doxywizard

- Windows:
  - 15 MB
  - Download installer from their site

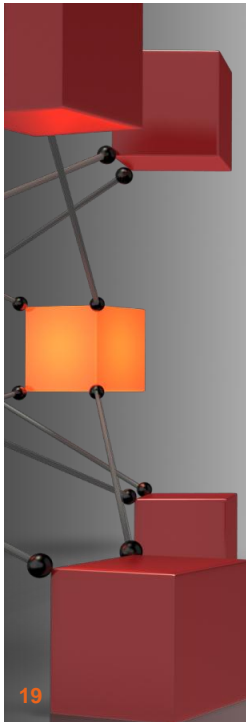- Mac OS X:
  - 44 MB
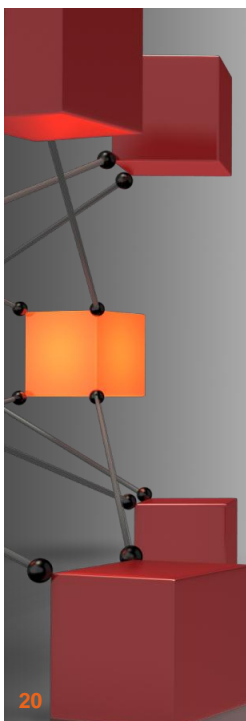 - Download installer from their site

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Example Code

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C++ Comments

// This is a single-line comment

```
/*
   This
   is
   a
   multi-line
   comment
*/
```

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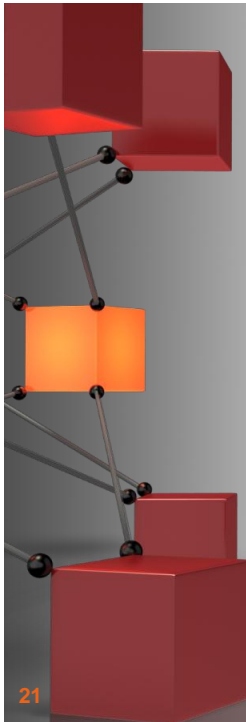
Doxygen Comments

/// This is a single-line Doxygen comment

```
/**
   This
   is
   a
   multi-line
   Doxygen
   comment
*/
```
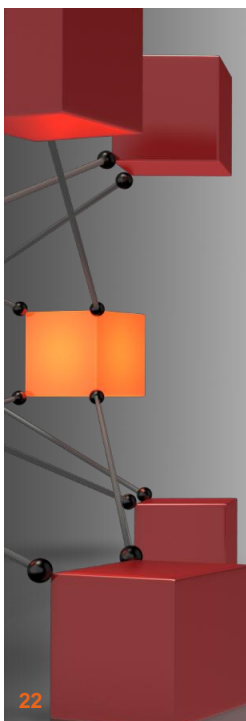
20

Qt Doxygen Comments

//! This is a single-line QtDoxygen comment

```
/*!
  This
  is
  a
  multi-line
  Qt Doxygen
  comment
*/
```

21
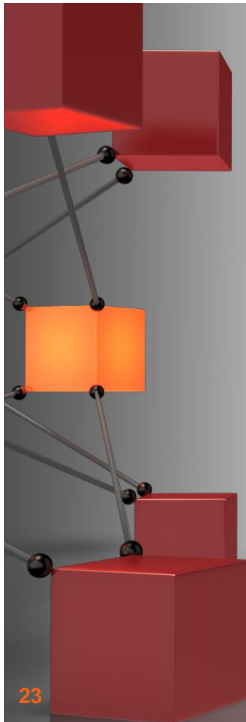
Doxygen Tags

- Tags start with **@** or ****

- Depends on which version you use

- Mostly both of them work
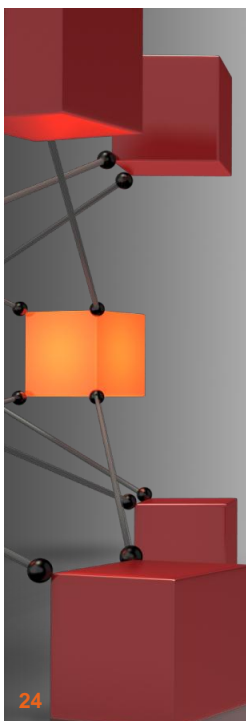
- Example:
  - @tag
  - \tag

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Doxygen – Class Tags

- @file

- @class

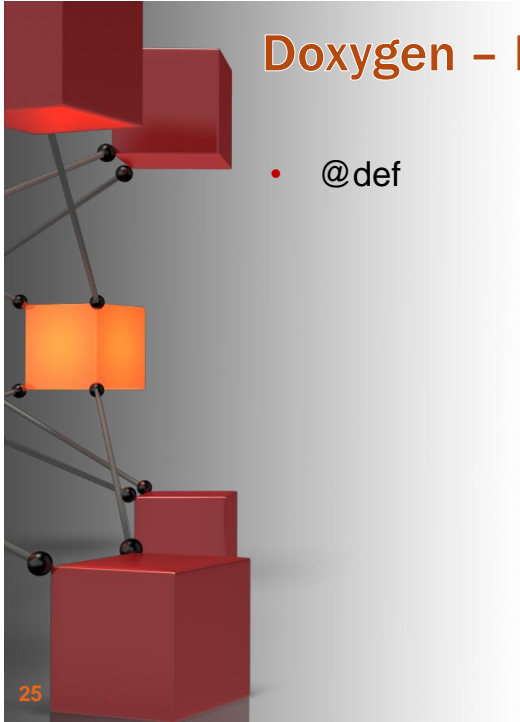- @author

- @version

- @brief

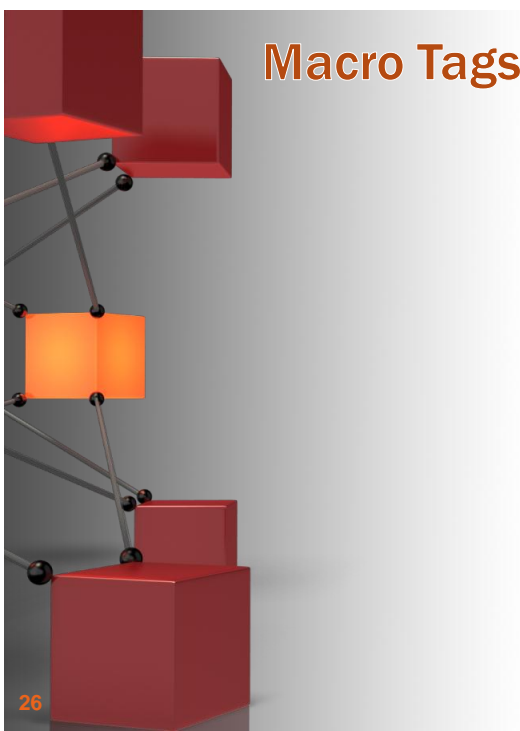- @section

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Class Tags Example

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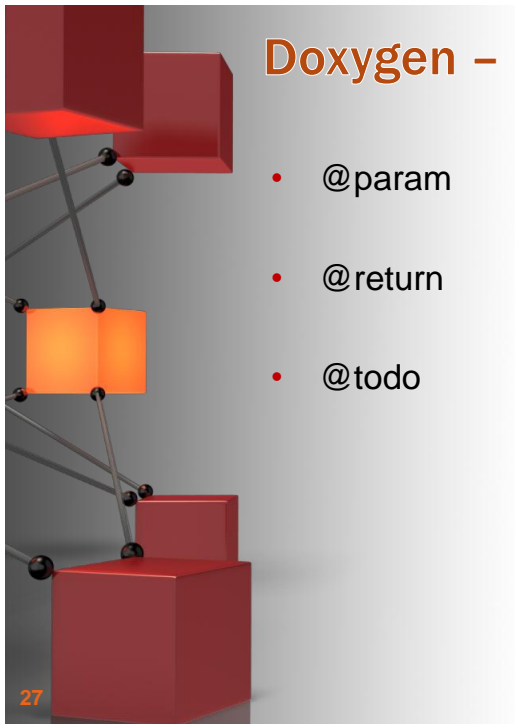## Doxygen – Macro Tags

- @def
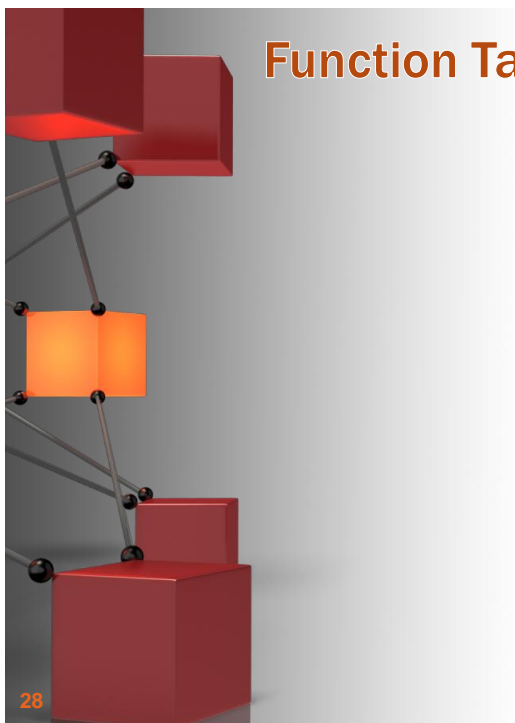
25

Macro Tags Example

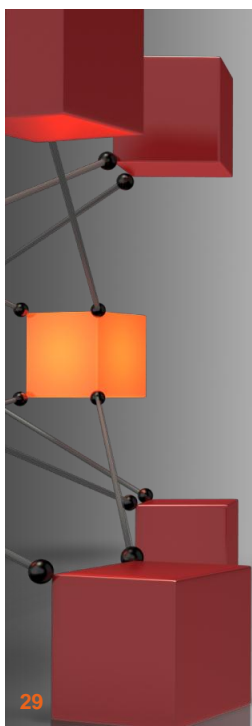26

Doxygen – Function Tags
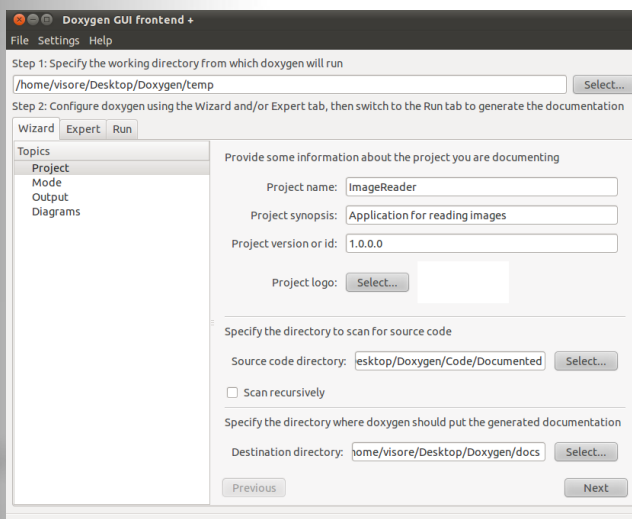
- @param

- @return
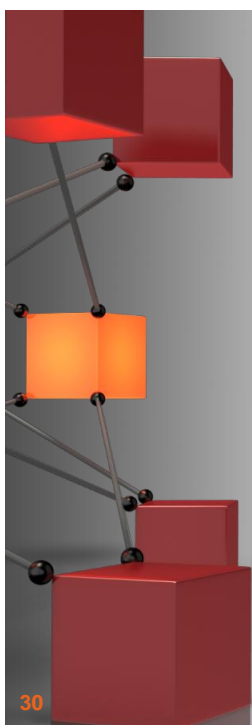
- @todo

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Function Tags Example
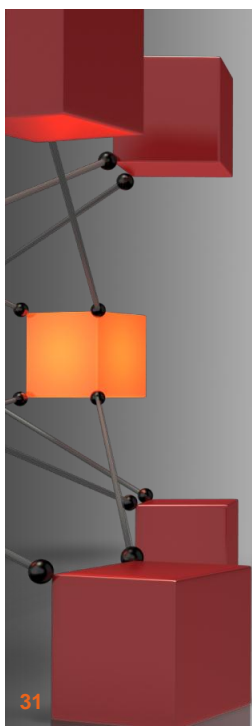
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Doxygen - Compilation

Latex

- Document markup language.
  - Intermediate format, mostly used in academia.
  - Similar to Microsoft Word.
  - Can be used to convert Doxygen output.
  - http://www.latex-project.org

- Document are compiled into:
  - PDF
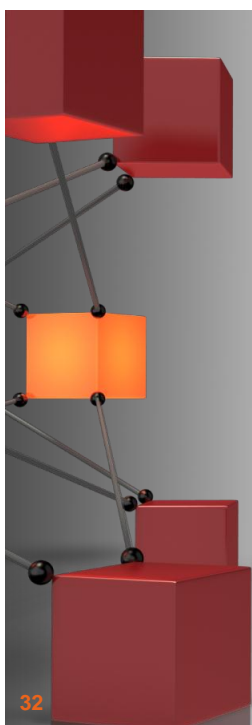 - DVI
  - PS
  - Many more …
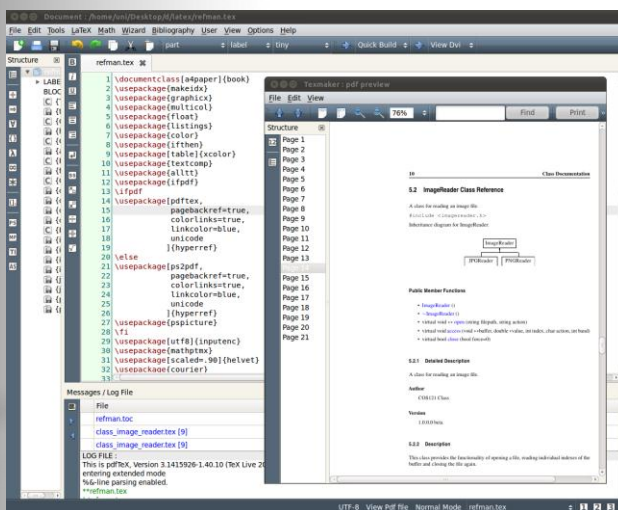
Latex - Installation

- In Ubuntu:
    - Basic Latex:
        - sudo apt-get install texlive
    - All packages:
        - sudo apt-get install texlive-full
    - Fonts needed by Doxygen:
        - sudo apt-get install texlive-fonts-recommended
    - Texmaker (GUI Latex Editor):
        - sudo apt-get install texmaker

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Latex - Texmaker

- Open refman.tex

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Doxygen – As HTML

Doxygen – As PDF

The End

Code Documentation & Doxygen
COS 121 – Christoph Stallmann