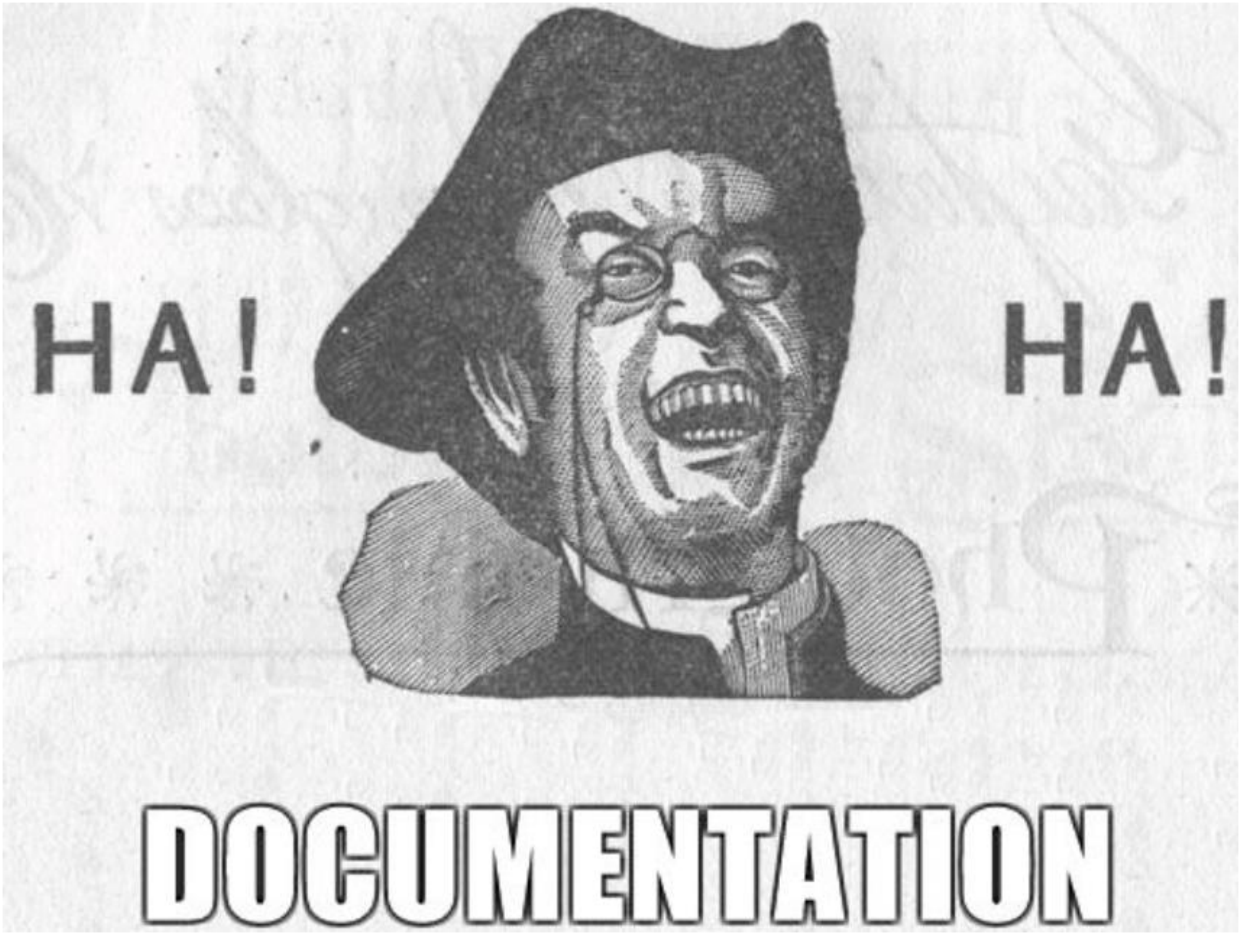
Software Engineering

(Documentation & Coding Standards)

Documentation
& Coding Standards


HA!
HA!
DOCUMENTATION

Documentation == Evil?

Do you think that …

- Documentation is tedious?
- An afterthought?
- Redundant?
- Messes up your self-documenting code?
- Is done only when you have to?
- …
- All of the above?

Types of (Project) Documentation

- Written documentation
  - READMEs, tutorials, how-to/reference guides, white papers, books
  - Project website
  - Design documentation, diagrams
- Code documentation
  - API docs, comments, example code, unit tests
- Community documentation
  - Blog posts, Q&A sites, forums, talks, videos, meet-up's/support/user groups, conferences

Is It Important?

Written (Project) Documentation

README files

- Very (most?) important file in codebase
- Represents first contact with new user
- Goal to “introduce” project, get them to stay
- Give pointers on what to do and how to get started
- Typical Sections:
  - Description, quick examples, quick start guide, links to more documentation, project organisation, legal notices

Tutorials / Guides

- Show the new user what can be done and patterns/best-practice way to do it.
- Highlight unique or powerful features
- Use a conversation/dialogue format (personal)
- Does not need to cover every topic,
- Does not need to go in-depth (use links)
- Interactive tutorials or videos have strong value

Reference Documentation

- Provide the user with a way to find out about specific topics (not just wander through the entire API)
- Cover all the major topics in depth
- Organise information so that it is easy to navigate and search
- Good to have key-words/index/see-also.

Project Website

- Documentation as marketing!
- Create a look-and-feel (brand) for the project
- Good for search, links and social media
- Integrated project hosting webpages (github wiki's) are an easy way.

Big Ones?

- API generated documentation
- Project level documentation
- Code examples / how-to documentation
- User documentation

UP TO DATE DOCUMENTATION
NOW THERE IS SOMETHING I HAVEN'T SEEN IN A LONG TIME.
imgflip.com

Coding Conventions & Standards

Conventions & Standards

- Good coding conventions:
  - Create consistent looking code so a reader can focus on function, not layout
  - Familiarity allows a reader to make correct assumptions based on layout
  - Helps in changing and maintaining code
  - Reduces errors in logic

What are they?

Rules/Standards
(that <u>must</u> be followed)

vs

Conventions/Guidelines
(that <u>should</u> be followed)

Why?

“Productivity by convention”

- Better for maintenance
- Clear code == Less bugs
- Good for teamwork
- Flexible teams
- Lower costs

… and because you care about quality!

Where do they come from?

- Set by the team, or a company
  - Often written by senior or lead developers
  - Based on experience
  - Based on personal preferences
- Set by language and tool developers (vendors)
  - Works well with the languages
  - Works well with the tools
  - Because they like it that way …

Naming Conventions

Based on Microsoft C# design guidelines

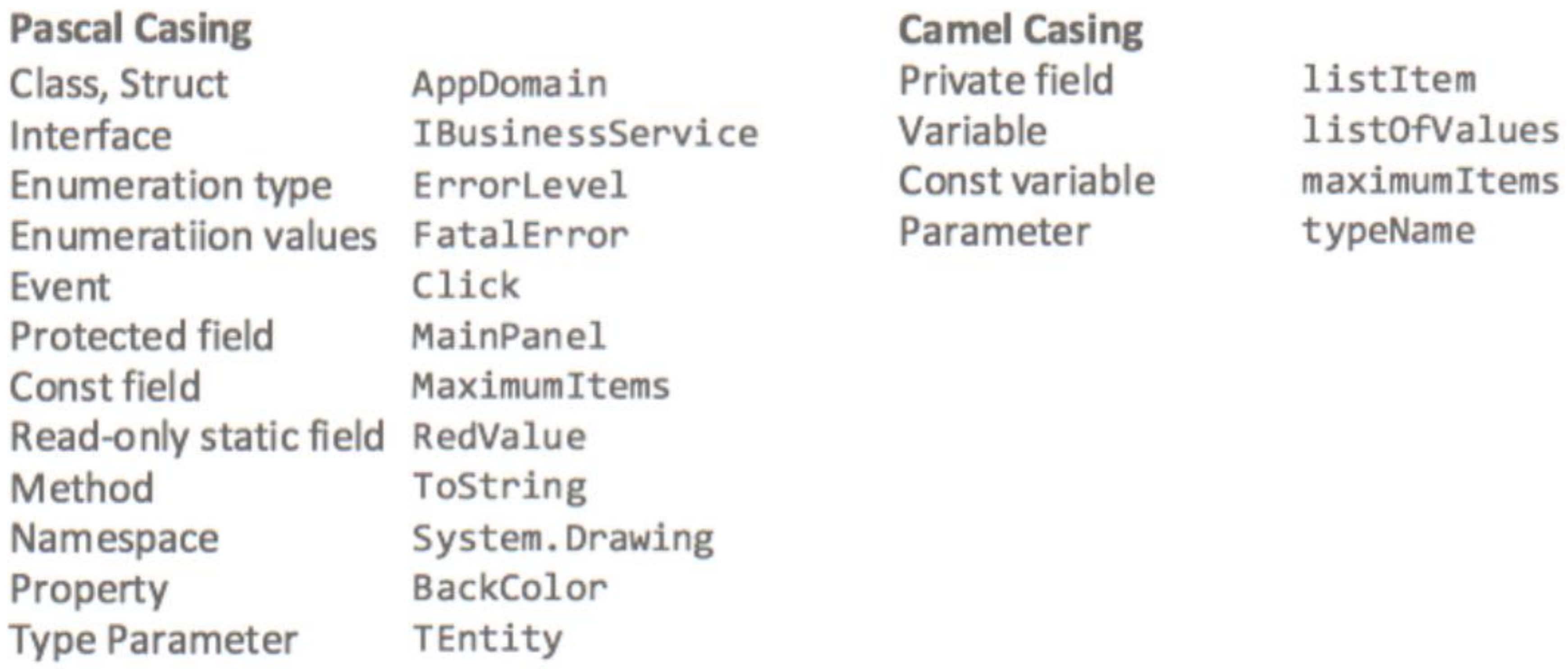
Naming Conventions

- Capitalization:
  - Used to identify each word in a name
  - PacalCasing (most) and camelCasing (params)
- Don’t use _ anywhere (or hyphens etc)
- Choose readable (long) over brevity
- Avoid conflict with identifiers / common
- Avoid language (type) specific names

Naming Conventions

- Use nouns or noun phrases for classes and structs (in PascalCasing)
- Use adjective phrases for interfaces, with “I” as a prefix
- Methods should be verbs or verb phrases, and always PascalCasing
- Use plural phrase for collections
- Events should be a verb or verb phrase

Naming Conventions



Pascal Casing	
Class, Struct	`AppDomain`
Interface	`IBusinessService`
Enumeration type	`ErrorLevel`
Enumeratiion values	`FatalError`
Event	`Click`
Protected field	`MainPanel`
Const field	`MaximumItems`
Read-only static field	`RedValue`
Method	`ToString`
Namespace	`System.Drawing`
Property	`BackColor`
Type Parameter	`TEntity`

Camel Casing	
Private field	`listItem`
Variable	`listOfValues`
Const variable	`maximumItems`
Parameter	`typeName`

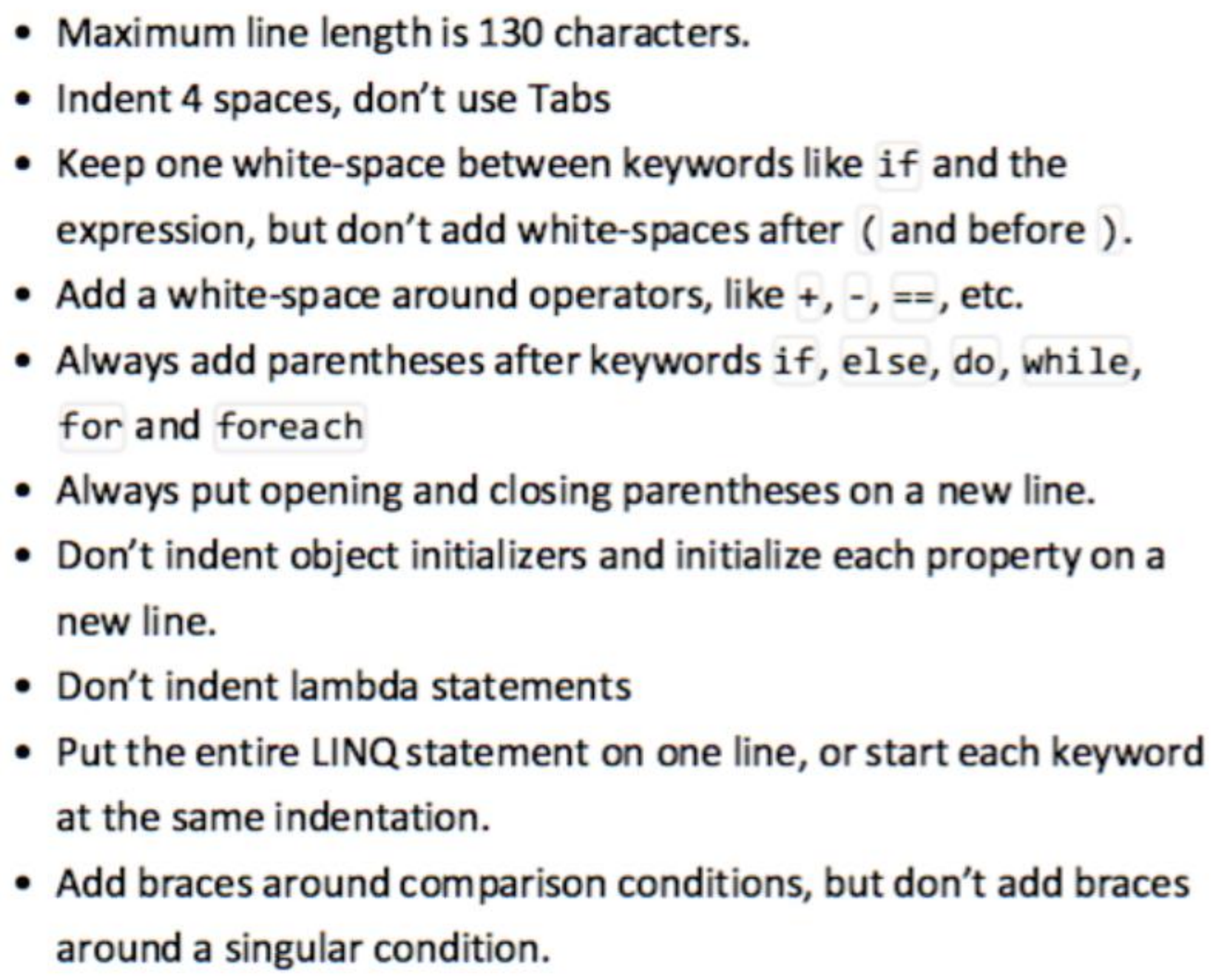
Layout Conventions

- Empty lines
  - Between members
  - After the closing parenthesis
  - Between multi-line statements
  - Between unrelated code blocks
  - Around the #region keyword
  - Between using statements of different root names

Member Order

1. Private fields and constants
2. Public constants
3. Public read-only static fields
4. Factory Methods
5. Constructors and the Finalizer
6. Events
7. Public Properties
8. Other methods/private properties in calling order

Layout Conventions



- Maximum line length is 130 characters.
- Indent 4 spaces, don't use Tabs
- Keep one white-space between keywords like `if` and the expression, but don't add white-spaces after `(` and before `)`.
- Add a white-space around operators, like `+`, `-`, `==`, etc.
- Always add parentheses after keywords `if`, `else`, `do`, `while`, `for` and `foreach`
- Always put opening and closing parentheses on a new line.
- Don't indent object initializers and initialize each property on a new line.
- Don't indent lambda statements
- Put the entire LINQ statement on one line, or start each keyword at the same indentation.
- Add braces around comparison conditions, but don't add braces around a singular condition.

Code Comments

Comments

“Code tells you how. Comments tell you why.”

- Can be a very important information source, but use them wisely!
- There is no point writing trivial comments
- Use them in moderation
- Always focus on the “why”

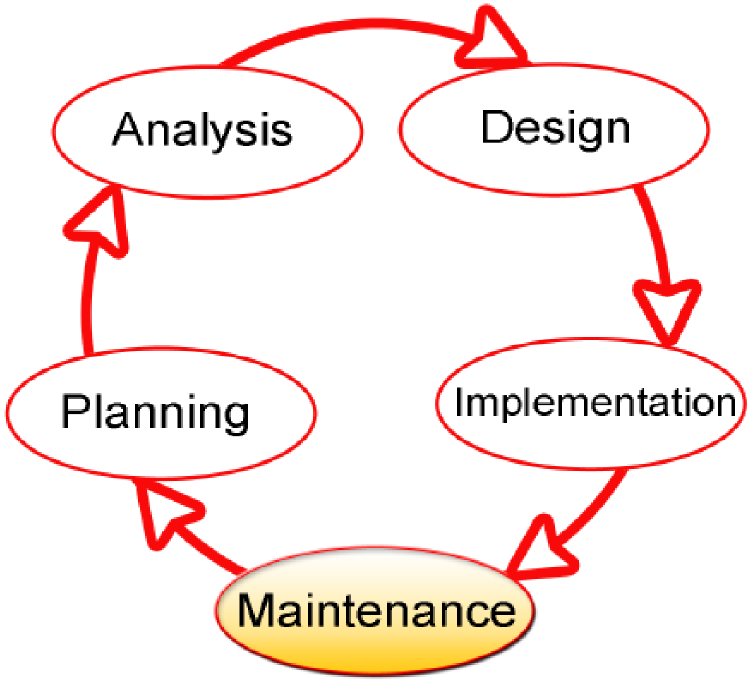
Documentation is a BIG topic!

It’s worth doing it well.

Coding Standards

Why

- Better for maintenance
- Less bugs
- Good Teamwork
- Flexible Teams
- Lower Cost



- ... because you care about quality!

Example: Indentation

- Be consistent to be clear (convention)
  - Easier to read and understand
  - Easier to maintain
- Used to clearly show scope or blocks
  - Supports the programming ideas
- Rules for functions, objects, blocks
- Does not affect what the code means in most languages

Example: Comments

… Yes! That topic again!

- Applies to all programming languages
- Typically ignored by the complier/interpreter
- Should clearly explain the “why” not the “what” (which is the code)
- Should NOT have a comment on every line
- If it gets messy, it’s probably bad code design

Example: Whitespace

- Very important for clarity
- Can be easily overlooked
- Often the lack of whitespace can hide the logic or flow control problem (i.e. you don’t have the blocks you think you have.)

Example: Naming Convention

- The “names” you choose are part of your documentation.
- Take care, get it right, change if you need to!
- There are some very common rules about what characters can be used in names, but that doesn’t mean your program should use every possible variation!

Why Have Coding Standards

- Tasks are small divisions of work that need to be done.
- Big tasks should be broken down into small tasks
- The outcome of the task should be clearly defined
- Productive, flexible and visible

Documentation Generators

JS Doc
JavaScript

phpDocumentor

Java

JavaDoc

SPHINX
PYTHON DOCUMENTATION GENERATOR

VSdocman

doxygen

python

yard
yay, a documentation tool

perldoc 2.0
International Perl Documentation

Documentation Generator

- A programing tool to generate software documentation, for either programmers (API) or end users (end-user guides), by extracting details and special comments from source code files.
- The output format is typically HTML

Application Programming Interface (API)

- A set of clearly defined methods for communication between software components
- API documentation is intended for other developers so that they can use the services described
- Good quality documentation is essential

API Documentation

- API: Application Programming Interface are written to be used (by programmers)
- Typically each module/file, class, function (method) and variable are documented
- Provides a fine-grained format for describing details of all input and output
- Provides the opportunity for the author to explain why the code exists

Documentation Comments

Recommended C#
xml-doc Tags

C# xml-doc Tags

`<c>` `<code>`

`<example>` `<exception>`

`<include>` `<list>`

`<para>` `<param>` `<paramref>`

`<permission>` `<remarks>` `<returns>`

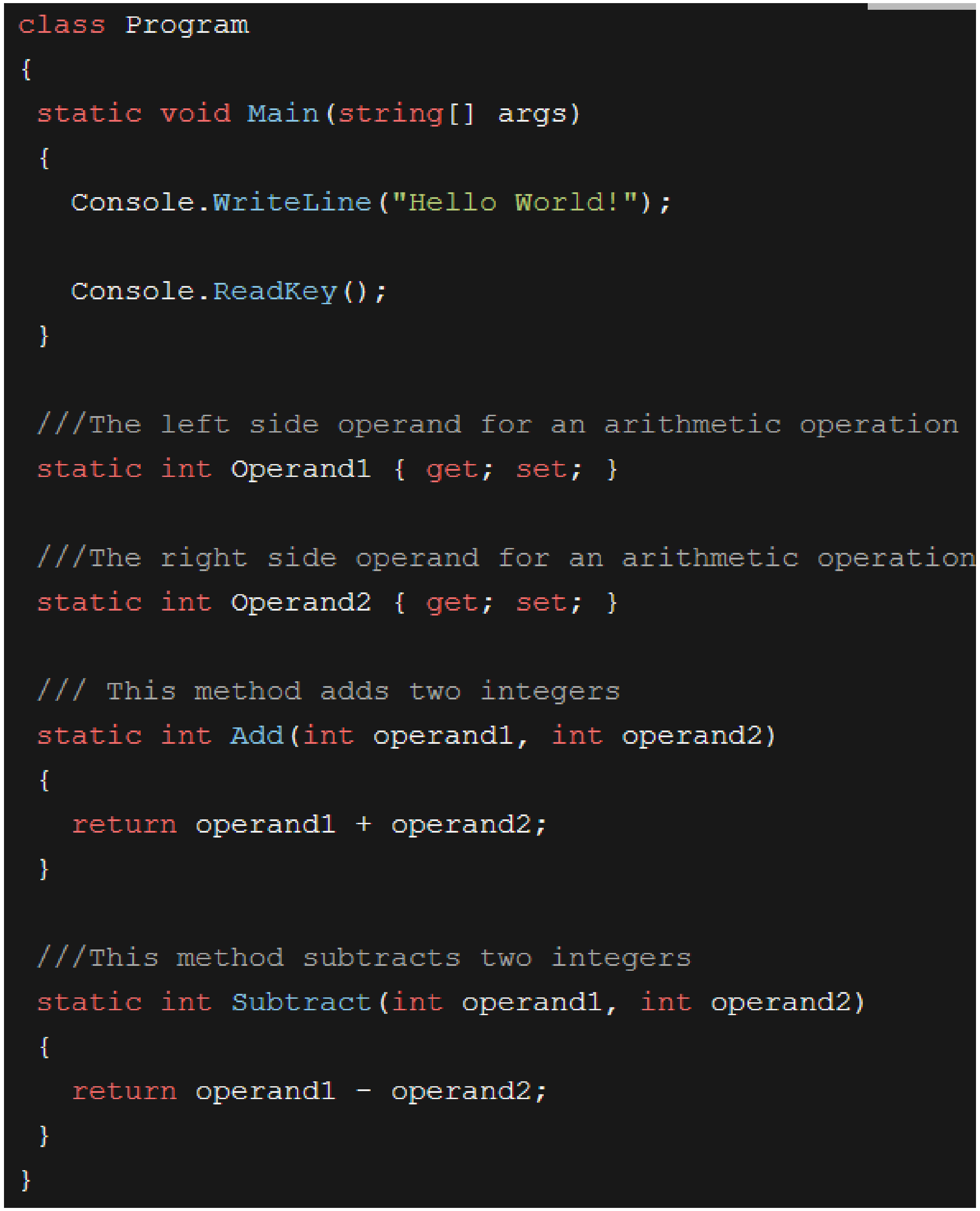
`<see>` `<seealso>` `<summary>`

`<typeparam>` `<typeparamref>`

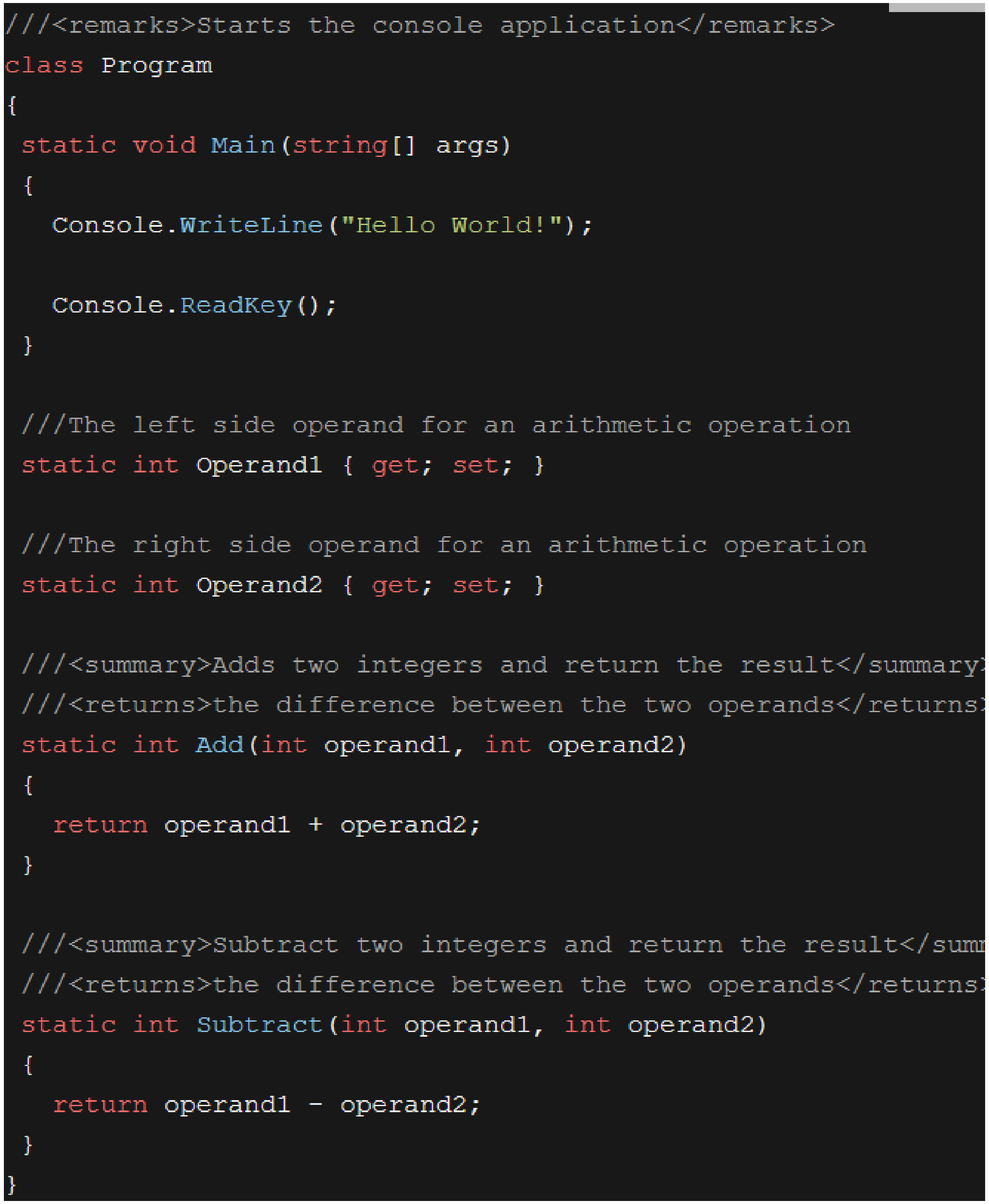
`<value>`

C# Example

```
/// <summary>
///  This class performs an important function.
/// </summary>
public class MyClass{}

/// <summary>
/// Summary
/// </summary>
/// <param name="param1">Some Parameter.</param>
/// <returns>What this method returns.</returns>
```



```
class Program
{
 static void Main(string[] args)
 {
   Console.WriteLine("Hello World!");

   Console.ReadKey();
 }

 ///The left side operand for an arithmetic operation
 static int Operand1 { get; set; }

 ///The right side operand for an arithmetic operation
 static int Operand2 { get; set; }

 /// This method adds two integers
 static int Add(int operand1, int operand2)
 {
   return operand1 + operand2;
 }

 ///This method subtracts two integers
 static int Subtract(int operand1, int operand2)
 {
   return operand1 - operand2;
 }
}
```



```
///<remarks>Starts the console application</remarks>
class Program
{
 static void Main(string[] args)
 {
   Console.WriteLine("Hello World!");

   Console.ReadKey();
 }

 ///The left side operand for an arithmetic operation
 static int Operand1 { get; set; }

 ///The right side operand for an arithmetic operation
 static int Operand2 { get; set; }

 ///<summary>Adds two integers and return the result</summary
 ///<returns>the difference between the two operands</returns
 static int Add(int operand1, int operand2)
 {
   return operand1 + operand2;
 }

 ///<summary>Subtract two integers and return the result</summ
 ///<returns>the difference between the two operands</returns
 static int Subtract(int operand1, int operand2)
 {
   return operand1 - operand2;
 }
}
```

Javadoc Example

```
/**
* <h1>Hello, World!</h1>
* The HelloWorld program implements an application that
* simply displays "Hello World!" to the standard output.
* <p>
* Giving proper comments in your program makes it more
* user friendly and it is assumed as a high quality code.
*
*
* @author  Zara Ali
* @version 1.0
* @since   2014-03-31
*/
public class HelloWorld {

   public static void main(String[] args) {
      // Prints Hello, World! on standard output.
      System.out.println("Hello World!");
   }
}
```

Community Documentation

People and Tools Create …

- Project software (bugs, issues, tasks …)
- Blog posts,
- Q&A sites (stack overflow …)
- Forums,
- (Tech) Talks,
- Meet-up/support groups,
- Conferences

People and Tools Create …

- Over time community documentation can be the most valuable support for new users
  - Have you ever searched using google with an error message string and found someone who had the same problem, and the solution?!
  - Add a diversity to the vocabulary that the original authors would not think of