

Coding Standard

Goals

Efficiently develop code and applications with the following qualities :

- **robust** : runs without crash and protects the data from being lost or corrupted.
- **secure** : protects the data from being stolen or hacked.
- **ergonomic** : can be used in an productive and intuitive manner.
- **efficient** : minimizes processing times to maximize the user productivity.
- **maintainable** : is easy to fix and enhance by any programmer in the team.
- **extensible** : is easy to extend with new features by reusing existing components.
- **consistent** : looks like it has been designed and implemented by a single developer.

Specificity

This coding standard favors code readability over compactness, by :

- Forbidding the use of cryptic acronyms, abbreviations, prefixes and suffixes;
- Using different letter cases for classes, class members and local variables;
- Including the type name in the attribute and variable names.

Rules

- Develop the application and its components with simple, robust and efficient code which will be easy to understand, extend and debug by any programmer in the team.
- Develop any piece of code so that it's :
 - **easy to understand** just by itself;
 - impossible to guess who has actually worked on it.
- Use **American English** for all the code, including comments.

```
InitializeColor();  
MoveForward();
```

- Use the **meter** as the default distance unit.
- Use the **second** as the default time unit.
- Use **four spaces** instead of tabulations.
- Choose **short meaningful identifiers** for class, attribute, method and variable names.
- Use **standard prefixes** :
 - First, Last, Post
 - Prior, Next
 - Sub, Super, Base
 - Initial, Final

- Old, New
- Backward, Forward
- Left, Right
- Back, Front
- Bottom, Top
- Minimum, Maximum
- Lower, Higher, Upper
- Vertical, Horizontal
- Use **standard suffixes** :
 - Index, Count
 - Array, List, Map, Dictionary
- Use **standard verbs** :
 - Initialize, Update, Finalize
 - Is, Has
 - Reset, Set, Get, Find
 - Clear, Fill
 - Add, Remove
 - AddFirst, AddLast
 - Create, Destroy
 - Start, Stop
 - Begin, End
 - Enter, Exit
 - Open, Close
 - Read, Write
 - Load, Save
 - Pause, Resume
 - Enable, Disable
 - Lock, Unlock
 - Select, Deselect
 - Activate, Deactivate
 - Attach, Detach
 - Increment, Decrement
 - Increase, Decrease
 - Compress, Decompress
 - Connect, Disconnect
 - Send, Receive
 - Grant, Revoke
- Write all **types** in **UPPER_CASE**, without articles.

```
class TANK_SHELL
{
}
```

- Write all **type members** (methods, attributes, etc) in **CamelCase**, without articles.

```
Tank.ShootShell();
```

- Write all **local variables** (including method parameters) in **snake_case**, without articles.

```
player_name
```

- Don't use acronyms, abbreviations or single-letter variables.

```
TANK FindTank(  
    int tank_identifier,  
    int first_tank_index  
    int post_tank_index  
)  
{  
    int  
        tank_index;  
  
    for ( tank_index = first_tank_index;  
        tank_index < post_tank_index;    // no i, j, n, etc  
        ++tank_index )  
    {  
        if ( TankArray[ tank_index ].Identifier == tank_identifier )  
        {  
            return TankArray[ tank_index ];  
        }  
    }  
  
    return null;  
}
```

- If you really have to use an acronym, capitalize it in member names.

```
DATABASE_URL  
    DatabaseUrl;
```

- If a variable name collides with a predefined identifier, simply add a trailing underscore.

```
CLASS  
    class_  
  
class_ = new CLASS;
```

- Include the class name (without numbers) in the attribute and variable names.

```
Dictionary<PLAYER, string>  
    ActivePlayerDictionary;  
  
List<ENEMY>
```

```

    CloseEnemyList;
TANK[]
    EnemyTankArray;
VECTOR_3
    InitialShellPositionVector,
    TankVelocityVector;

void ShootShell(
)
{
    SHELL
        last_shot_shell,
        shot_shell;

    ...
}

```

- Start method names by a verb in the imperative mood (Set, Get, Find, ...).
- Use a verb in the indicative mood for boolean inquiries (Is, Has, Can, ...).
- Declare the method parameters in the same order as in the method name.

```

bool FindPlayerIndexByName(
    ref int player_index,
    string player_name
)
{
    ...
}

```

- Use a positive affirmation for boolean variables and attributes.

```

if ( game_is_paused )
{
    ...
}

```

- When the attribute type starts like its owner type, omit the common prefix in the attribute name.

```

class TANK
{
    TANK_SHELL[]
        ShellArray;    // instead of TankShellArray
    bool
        IsDamaged;     // instead of TankIsDamaged
}

```

- Align matching braces.

```

bool CanShoot(
)
{
    return ShotShellCount < MaximumShellCount;
}

// ~~~

void ShootShell(
    VECTOR_3 initial_velocity_vector
)
{
    ...
}

```

- Put braces around your repeated or conditional code even for one line of code.

```

if ( remaining_shell_count > 0 )
{
    ShootShell();
}
else
{
    Reload();
}

```

- Declare each attribute, variable and method parameter name on separate line.

```

int
    tank_count,
    tank_index;

```

- Try to declare all local variables at the start of the method, to improve the algorithm readability.
- Group local variables of the same type, and sort the declarations by ascending types and names, so that the declaration of a variable can be located at a glance.

```

int
    shell_count,
    shell_index,
    tank_count,
    tank_index;
string
    player_name,
    target_name;

```

- Try to split statements on several lines if they become wider than 100 characters, so that it's easy to edit two code files side by side on a single monitor.

- When splitting an expression on several lines, start the next lines with an operator, and align it with the start of its left operand (or else indent it by 4 spaces).

```

if ( ( tower.GetDistance(
        tower_target,
        weapon_type
    )
    > tower.MaximumShootingDistance )
    || ( tank_distance > maximum distance
        && tank_health > 0.5 ) )
{
}

```

- Add exactly one space :
 - after ([,
 - before)]
 - after if' while for ` ...
- Add exactly one empty line :
 - after a standard comment;
 - after the local variable declarations;
 - between a closing brace and the next statement.
 - between a return statement and the prior statement;
- Group the class elements by category, declared in the same predefined order :
 - Imports
 - Constants
 - Attributes
 - Constructors
 - Destructor
 - Operators
 - Inquiries (instance methods which won't change the instance attributes)
 - Operations (instance methods which can change the instance attributes)
 - Functions (static methods which don't belong to any instance)
- In a class, declare the called methods before the calling methods, so that the class code can be understood by a single sequential read.
- Use public attributes and methods, unless you really need to declare some of them as private.
- Use standard file extensions.
 - C# : cs
 - C++ : cpp, hpp
 - C : c, h
 - Javascript : js
 - HTML : html
 - CSS : css
- Declare one class per source code file.
- Use the class name in lowercase as file name.

```
tank_shell.cs  
tank_shell.cpp  
tank_shell.hpp
```

- Use the class name in uppercase for Unity source code files.

```
TANK_SHELL.cs
```

- Delimitate the code sections with standard comments.

```
// -- IMPORTS  
  
...  
  
// -- TYPES  
  
class NAME  
{  
    // -- CONSTANTS  
  
    ...  
  
    // -- ATTRIBUTES  
  
    ...  
  
    // -- CONSTRUCTORS  
  
    ...  
  
    // -- DESTRUCTOR  
  
    ...  
  
    // -- OPERATORS  
  
    ...  
  
    // -- INQUIRIES  
  
    ...  
  
    // -- OPERATIONS  
  
    ...  
  
    // -- FUNCTIONS  
  
    ...  
}
```

- Don't use standard comments for empty sections.
- Align multiple lines comments with the surrounding statements, and write them as sentences.

```
/*
    A long explanation which is so long that it will have to be
    be split on several lines.
*/

...
```

- Align single line comments with the surrounding statements, and write them as sentences.

```
// A short explanation on a single line.

...
```

- Put end of line comments exactly four spaces after the statement, and start them in lowercase.

```
some_variable = some_magic_value;    // a short explanation
```

- Instead of adding comments to explain the code intent, refactor it to make it easy to understand without comments and improve its reusability.
- Begin C++ header files with `#pragma once`.

```
#pragma once

// -- IMPORTS

#include "tank.hpp"
#include "tank_shell.hpp"

...
```

- Name the unit test class by simply adding the `_TEST` suffix to the class name.

Advices

- Design before you program, to avoid losing precious time in developing the wrong solution to the wrong problem.
- First find what is really needed, by taking a few minutes to write :
 - a short text explaining how to use the application before implementing it, to optimize its interface.
 - a short text explaining what the application components will do before implementing them, to optimize their architecture.
 - a short text or test code explaining how the other programmers will use the application components, to optimize their class interface.

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Author

Eric Pelzer (ecstatic.coder@gmail.com).

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