

MicroCODE Software Engineering Services

Project Coding Standards

MCX-S02 (Internal JS Style Guide) v003.docx

Development Environment: Microsoft Visual Studio Code

OS: HTML5 Browser Environment

Platform: Open Source ES6, HTML5, CSS3

Language: JavaScript (ECMAScript 6 – ES6)

Tools: JSLint, JSHint

MicroCODE JavaScript Style Guide

This was adopted from the **MIT xPRO JavaScript Certificate Style Guide**, differences are noted. The MIT guide was in turn adapted from the [Airbnb style guide](#) and [the Turing School style guide](#).

Everything we believe is based on this statement:

Code like a Machine: Consistently, Explicitly, Simply, and for Readability (CESR).

All our rules are marked with one or more of these to relate back to this statement:
(Code Consistently) (Code Explicitly) (Code Simply) (Code for Readability)

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Standard Terminology (MicroCODE)

Any Style Guide should start with **coding terminology** because there is a general lack of standardized terms.

() – these are **PARENS**, short for parentheses, they are not ‘round brackets’ or ‘round braces’, parens by our definition are a pair of round delimiters.

[] – these are **BRACKETS**. They are not braces, they are not ‘square brackets’, brackets are by our definition are a pair of square delimiters.

{ } – these are **BRACES**. They are not brackets, they are not ‘curly brackets’ nor ‘curly braces’, braces are by our definition are a pair of a ‘curly’ delimiters. Saying ‘curly braces’ is redundant, saying ‘curly brackets’ is just wrong.

< > – these are **ANGLES**. They are not brackets, they are not ‘angled brackets’ nor ‘angled braces’, angles are by our definition a pair of angular delimiters.

In typography all of these are referred to generically as ‘brackets’. A nice article explaining this:

<https://type.today/en/journal/brackets>. But we are not talking about typesetting, we are talking about coding, and precise language eliminates confusion and mistakes; it produces consistent results and saves time & money. And so, for all our code and documentation... ([Code Consistently](#))

Code Delimiters

```
( ) = PARENS:    parameter grouping, operand precedence, quantities
[ ] = BRACKETS: indexing, array formation
{ } = BRACES:    code blocks, initialization values (compiler)
< > = ANGLES:    substitution identifier, option grouping
```

Boolean Expressions

```
& = AND: inclusive
| = OR:  optional
! = NOT: exclusive
```

```
() = AND Group, everything within is AND'ed
```

```
<> = OR Group, everything within is OR'ed
```

Boolean Equations

```
RPO ABC <XYZ ABO YUT> !ZZY Z71
RPO ABC <XYZ (ABO BBC !CDC) YUT> !ZZY Z71
```

Implies, in more detail...

```
&RPO &ABC <XYZ ABO YUT> !ZZY &Z71
&RPO &ABC <XYZ (ABO BBC !CDC) YUT> !ZZY &Z71
```

Implies, in complete notation...

```
&RPO &ABC &<XYZ|ABO|YUT> &!ZZY &Z71
&RPO &ABC &<XYZ|(&ABO &BBC &!CDC)|YUT> &!ZZY &Z71
```



Standard Terminology (continued)

Interlocks, Signals, and Memories vary in duration, persistence, and interactions. This should be understood immediately by the 'Parameter Persistence Type'. ([Code Consistently](#))

ONE-SHOT – an application variable—usually a BOOLEAN—that goes from FALSE to TRUE for a single program scan or routine execution.

RISING-EDGE – a signal condition—regarding a BOOLEAN—that indicates the variable has gone from FALSE to TRUE during this program scan or routine execution.

FALLING-EDGE – a signal condition—regarding a BOOLEAN—that indicates the variable has gone from TRUE to FALSE during this program scan or routine execution.

PULSE – an application variable—usually a BOOLEAN—that goes from FALSE to TRUE for specified (or configured) duration, normally specified in milliseconds.

INTERLOCK – an application variable—any PRIMITIVE or OBJECT—that is presented to external equipment or a remote application until it is Acknowledged (ACK/NAK). This implies retries and failure annunciation if not acknowledged.

MEMORY – an application variable—any PRIMITIVE or OBJECT—that changes state based on program scan or routine execution. These can be *temporary* or *persistent*.

CONTEXT – the sum total of all the application's **Persistent Memory** that control its behavior. Persistent Memory should be stored permanently from one session to another for a consistent User Experience (UX). The quality of this persistence is what gives a user confidence in a system or application, providing the feeling that 'it remembers what I was doing, and I did not have to configure anything for that to happen'.

CONFIGURATION – a special subset of the application's **Persistent Memory** that represents User Preferences or User Settings, usually configured by them thru the User Interface (UI) thru the 'Gear' or 'Cog' Icon. These settings must be protected thru all Application Upgrades as they represent 'User Work Products'. These settings must be written to permanent data storage, i.e.: a configuration file or database.



Font Selection and Readability (MicroCODE)

We believe you should always code in a mono-spaced font. (Code Consistently)

The only explanation required is a couple simple examples:

Monospace – enables the creation of text tables in documentation.

```

Compare.cs
ERS\SHR\UPD\Compare.cs
LADDERS.Compare
Compare()

91 * the Logic and Comments are brought into the :T.P.R.L:
92 * structure in RAM. The PLC Specific logic currently uses common
93 * methods to generate these, see Match.ChecksumLogic() and Match.ChecksumComment().
94 *
95 * ICode: A 64-bit locator of a INSTRUCTIONS Record.
96 * In the VAX/VMS App the ICODEWED located one of 4 billion Rung Records on disk with a 32-Bit integer.
97 * In the WNT/AM App the ICode is four (4) 16-Bit INTs, that can be saved as a single 64-Bit integer, a 'C' LO
98 * These index directly into the CONTROLLER Objects in RAM in the :T.P.R.L: structure.
99 *
100 *
101 * VAX/VMS: 32-Bit Integers (VAX Register size)
102 * CMP.DAT entry BEFORE | (entries are in PLC order)
103 * UPD_COMPARE call is made ---->+-----+
104 * |! PLC ICODEWD | location in I*.DAT
105 * +-----+
106 * | PLC CHECKSUM1 |
107 * |-----|
108 * | PLC CHECKSUM2 |
109 * |-----|
110 * | PLC CHECKSUM3 |
111 * +-----+
112 *
113 *
114 * NOTE: VAX/VMS "I" is BIT31 set indicating this entry is in CHECKSUM format and
115 * has NOT been matched to a JOB rung.
116
117 CMP_IS_CHECKSUMS = ^x80000000 ; symbol for marking bit.
118
  
```

Monospace – makes coded tables instantly readable and exceptions pop-out.

```

AppScreen.cs
Compare.cs
Control (EPP)
MicroCODE.AppScreen
AppResourceNamespace

118 PrivateConstants
119 // PRIVATE FIELDS
120 #region Fields
121
122 #region Lists
123
124 // EVENTS [ ] - Application Event Definitions, Text, Color, and Display ...
125 #region AppEvents -- Lists for defining application events for this class
126
127 private static readonly AppEvent.Definition[] _events = new AppEvent.Definition[(int)(Signal.ListCount + 1)]
128 {
129     // Event list
130     new AppEvent.Definition((int)Signal.ClearEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
131     new AppEvent.Definition((int)Signal.ShowEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
132     new AppEvent.Definition((int)Signal.RefreshEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
133     new AppEvent.Definition((int)Signal.Exception, "Exception", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
134     new AppEvent.Definition((int)Signal.Unauthorized, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
135     new AppEvent.Definition((int)Signal.WrongFramework, "Exception", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unk),
136     new AppEvent.Definition((int)Signal.SimCarrier, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
137     new AppEvent.Definition((int)Signal.SimBlocked, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
138     new AppEvent.Definition((int)Signal.SimNoSeed, "Failed", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Err),
139     new AppEvent.Definition((int)Signal.SimBusy, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
140     new AppEvent.Definition((int)Signal.SimIsReal, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
141     new AppEvent.Definition((int)Signal.SimUnconnected, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
142     new AppEvent.Definition((int)Signal.SimRetrying, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.War),
143     new AppEvent.Definition((int)Signal.SimFailed, "Failed", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Err),
144     new AppEvent.Definition((int)Signal.SimRunning, "Started", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Cor),
145     new AppEvent.Definition((int)Signal.SimStopped, "Stopped", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.In)
146 }
  
```



Proportional – creates a mess. A must for User documentation, bad for code.

```

191 * the Logic and Comments are brought into the :T.P.R.L:
192 * structure in RAM. The PLC Specific logic currently uses common
193 * methods to generate these, see Match.ChecksumLogic() and Match.ChecksumComment().
194 *
195 * ICode: A 64-bit locator of a INSTRUCTIONS Record.
196 * In the VAX/VMS App the ICODEWED located one of 4 billion Rung Records on disk with a 32-Bit integer.
197 * In the WNT/PLC App the ICode is four (4) 16-Bit INTs, that can be saved as a single 64-Bit integer, a 'C' LONG.
198 * These index directly into the CONTROLLER Objects in RAM in the :T.P.R.L: structure.
199 *
200 *
201 * VAX/VMS: 32-Bit Integers (VAX Register size)
202 * CMP.DAT entry BEFORE | | (entries are in PLC order)
203 * UPD_COMPARE call is made --> +-----+
204 * |! PLC ICODEWD | location in I*.DAT
205 * +-----+
206 * | PLC CHECKSUM1 |
207 * |-----|
208 * | PLC CHECKSUM2 |
209 * |-----|
210 * | PLC CHECKSUM3 |
211 * +-----+
212 * | |
213 *
214 * NOTE: VAX/VMS "I" is BIT31 set indicating this entry is in CHECKSUM format and
215 * has NOT been matched to a JOB rung.
216
217 CMP_IS_CHECKSUMS =^x80000000 : symbol for marking bit.
218

```

Proportional – creates a mess, coded tables are much harder to read.

```

120 #region Fields
121
122 #region Lists
123
124 // EVENTS[] - Application Event Definitions, Text, Color, and Display...
125 #region AppEvents - Lists for defining application events for this class
126
127 private static readonly AppEvent.Definition[] _events = new AppEvent.Definition[(int)Signal.ListCount + 1]
128 {
129 // Event list
130 // Number Sound Image Info Class Severity Audience Repeatabe Persistent Targets
131 new AppEvent.Definition((int)Signal.ClearEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Undefined, AppEvent.Audience.Undefined, f,
132 new AppEvent.Definition((int)Signal.ShowEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Undefined, AppEvent.Audience.Operator, f,
133 new AppEvent.Definition((int)Signal.RefreshEvents, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Undefined, AppEvent.Audience.Operator, f,
134 new AppEvent.Definition((int)Signal.Exception, "Exception", "APP", ExceptionInfo_Click, AppSpecific.Code.Application, AppEvent.Severity.Unexpected, AppEvent.Audience.Develop,
135 new AppEvent.Definition((int)Signal.Unauthorized, "None", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unexpected, AppEvent.Audience.Develop,
136 new AppEvent.Definition((int)Signal.WrongFramework, "Exception", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Unexpected, AppEvent.Audience.Develop,
137 new AppEvent.Definition((int)Signal.SimCarrier, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Warning, AppEvent.Audience.Operator, tr,
138 new AppEvent.Definition((int)Signal.SimBlocked, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Warning, AppEvent.Audience.Operator, ti,
139 new AppEvent.Definition((int)Signal.SimNoSeed, "Failed", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Error, AppEvent.Audience.Operator, true,
140 new AppEvent.Definition((int)Signal.SimBusy, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Warning, AppEvent.Audience.Operator, tr,
141 new AppEvent.Definition((int)Signal.SimIsReal, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Warning, AppEvent.Audience.Operator, tr,
142 new AppEvent.Definition((int)Signal.SimUnconnected, "Warning", "APP", null, AppSpecific.Code.Application, AppEvent.Severity.Warning, AppEvent.Audience.Operator,

```

ProFontWindows is our font of choice, it's well designed, scales perfectly, clearly shows the differences between brackets, braces, parens, and angles; and has slashed Zeros (a must).

```
AppScreen.cs - X Compare.cs
Control (EPP) MicroCODE.AppScreen AppResourceNamespace

113 // Private Fields
114 //region Fields
115
116 // Event list
117 new AppEvent.Definition((int)Signal.ClearEvents, "None", "APP", null, null, AppSpec
118 new AppEvent.Definition((int)Signal.ShowEvents, "None", "APP", null, null, AppSpec
119 new AppEvent.Definition((int)Signal.RefreshEvents, "None", "APP", null, null, AppSpec
120 new AppEvent.Definition((int)Signal.Exception, "Exception", "APP", ExceptionInfo_Click, AppSpec
121 new AppEvent.Definition((int)Signal.Unauthorized, "None", "APP", null, null, AppSpec
122 new AppEvent.Definition((int)Signal.WrongFramework, "Exception", "APP", null, null, AppSpec
123 new AppEvent.Definition((int)Signal.SimCarrier, "Warning", "APP", null, null, AppSpec
124 new AppEvent.Definition((int)Signal.SimBlocked, "Warning", "APP", null, null, AppSpec
125
126 private static readonly AppEvent.Definition[] _events = new AppEvent.Definition[(int)Signal.ListCount + 1]
127 {
128 // Event list
129 new AppEvent.Definition((int)Signal.ClearEvents, "None", "APP", null, null, AppSpec
130 new AppEvent.Definition((int)Signal.ShowEvents, "None", "APP", null, null, AppSpec
131 new AppEvent.Definition((int)Signal.RefreshEvents, "None", "APP", null, null, AppSpec
132 new AppEvent.Definition((int)Signal.Exception, "Exception", "APP", ExceptionInfo_Click, AppSpec
133 new AppEvent.Definition((int)Signal.Unauthorized, "None", "APP", null, null, AppSpec
134 new AppEvent.Definition((int)Signal.WrongFramework, "Exception", "APP", null, null, AppSpec
135 new AppEvent.Definition((int)Signal.SimCarrier, "Warning", "APP", null, null, AppSpec
136 new AppEvent.Definition((int)Signal.SimBlocked, "Warning", "APP", null, null, AppSpec
137
138 }
139
140 //region
141 }
```

```
AppScreen.cs - X Compare.cs
Control (EPP) MicroCODE.AppScreen AppResourceNamespace

113 PrivateConstants
114
115 // PRIVATE FIELDS
116 #region Fields
117
118 #region Lists
119
120 // EVENTS - Application Event Definitions, Text, Color, and Display ...
121 #region AppEvents -- Lists for defining application events for this class
122
123 private static readonly AppEvent.Definition[] _events = new AppEvent.Definition[(int)Signal.ListCount + 1]
124 {
125 // Event list
126 new AppEvent.Definition((int)Signal.ClearEvents, "None", "APP", null, null, AppSpec
127 new AppEvent.Definition((int)Signal.ShowEvents, "None", "APP", null, null, AppSpec
128 new AppEvent.Definition((int)Signal.RefreshEvents, "None", "APP", null, null, AppSpec
129 new AppEvent.Definition((int)Signal.Exception, "Exception", "APP", ExceptionInfo_Click, AppSpec
130 new AppEvent.Definition((int)Signal.Unauthorized, "None", "APP", null, null, AppSpec
131 new AppEvent.Definition((int)Signal.WrongFramework, "Exception", "APP", null, null, AppSpec
132 new AppEvent.Definition((int)Signal.SimCarrier, "Warning", "APP", null, null, AppSpec
133 new AppEvent.Definition((int)Signal.SimBlocked, "Warning", "APP", null, null, AppSpec
134
135 }
```

0 1 2 3 4 5 6 7 8 9 0
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
@ # \$ % ^ & * () [] { } < > _ + - = \ / |
; : ' " , . ? ! ~



Indents, Braces, Blocks, and Aligned-Code (MicroCODE)

Common JavaScript Style Guides like to use Kernighan & Richie (K&R) 'Egyptian Brackets'.

Right off the bat, they are really not talking about “brackets” they are talking about “braces”.

Our opinion is that this style ‘saves’ one line break per block of code at the expense of readability.

Why? Because the key word expressions like ‘if’ and ‘else’ overlap and offset the code of the clause.

This style saved screen space when people coded on 24-Line CRTs (like the VT52s, VT100s, VT220s, etc.) and saved paper when people printed code. We have neither of these limitations in the 21st Century; white space is your friend, delimiter alignment is your friend, language keyword alignment is your friend.

Note: Aligned-Code is also known as **Allman Style** (after Eric Allman) or **BSD Style** – Berkeley Software Distribution.

```
if (condition) {  
    // true code  
} else {  
    // false code  
}  
  
try {  
    // protected code  
} catch {  
    // correction code  
} finally {  
    // exit code  
}
```

K&R Style

The above is K&R, below is BSD which is our preferred JavaScript Style (and C/C++/C# Style as well).

The braces are aligned.

The key words are aligned.

All code blocks are held within aligned braces.

All conditional code has natural white space around it via the braces.

People will argue that K&R is easy to read, but they are relaying on colorized text editors that are hiding the readability issue in the bare text. **There is no world in which K&R is easier to read and maintain than BSD.**

```
if (condition)  
{  
    // true code  
}  
else  
{  
    // false code  
}  
  
try  
{  
    // protected code  
}  
catch  
{  
    // correction code  
}  
finally  
{  
    // exit code  
}
```

BSD Style



Notice in the second example the conditional code is naturally separated by white space created by the balanced braces, this makes the code far more readable than the 'Egyptian Brackets'. And there are no excuses based on typing speed, as these preferences can all be enforced automatically by VS CODE Settings.

White space is your friend and aids in readability; half the effort of maintaining code is readability and consistency.

As an extension, when building conditional execution, braces should always be used—and all code blocks should be placed on the lines following the conditional expression.

```
if (condition) ... // true code - DO NOT DO THIS

if (condition)
  ... // true code - DO NOT DO THIS

if (condition)
{
  ... // true code - ALWAYS DO THIS, conditional code in a BLOCK of BRACES, 'ALIGNED'
  ... // here is example a line added in the future, no reformatting required
}
```

This first reason for this is consistency and long-term maintenance. If the first two examples ever need editing—where an additional line of code needs to be added to the execution clause—the first thing that must be done is the addition of braces and the reformatting of the lines... a burden placed on the future coder by the original author. If line(s) of code are added in a hurry—and no braces are added—you just cost the next coder (or your future self) a good :10 minutes figuring out why their condition code is not working. It just not worth it.

The second reason is readability, it's just far easier to read all conditional code the same way, everywhere in a project, if it is all formatted exactly the same way.

It is often said: "Cleanliness is Next to Godliness", in coding we believe "Consistency is Next to Godliness".

The universe works on a set of consistent rules for a reason. If you code consistently—always following the same rules, always following the same patterns, where all code looks like it came from the same author, where all Classes follow the same format—you and your Team will reap the benefits now and forever. If your code is utterly consistent your Team members can code with assumptions that will always be true... **that** will speed up development more than any style can by saving typing white space or braces.

See **Appendix A: MicroCODE JS Class Structure** as an example of using a Template to make following these rules simple.

MCODE: "Code like a Machine: Consistently, Explicitly, Simply, and for Readability (CESR)."™

The combination of BSD Style, with the MCODE Rules, like always starting new modules from approved templates—no matter how simple the new Class or Module may be—we call...

MCODE Style

We've marked all AirBnB Rules that are eliminated as a side-effect of MCODE Style with...

MCODE Style eliminates



Whitespace

- Use soft tabs set to ~~2 spaces~~ 4 spaces. (Code for Readability).
- **Note:** Use 8 spaces for Assembly Language files from 1980s and 1990s or you will destroy diagrams, tabular data, etc. as these were created in CRT / VT100 environments.

```
// bad
function foo() {
var name;
}

// bad
function bar() {
var name;
}

// good
function baz()
{
var name;
}
```

MCODE Style eliminates

- ~~Place 1 space before the leading curly brace.~~
- Start all code blocks on new lines with aligned braces. (Code Consistently, Code for Readability).

```
// bad
function test(){
console.log('test');
}

// good
function test()
{
console.log('test');
}
```

MCODE Style eliminates

- ~~Place 1 space before the opening parenthesis in control statements (if, else if, while etc.).~~
- Start all code blocks on new lines with aligned braces. (Code Consistently, Code for Readability).

```
// bad
if(isSithLord) {
fight();
}

// good
if (isSithLord)
{
fight();
}
```

MCODE Style eliminates



- Place no space before the argument list in function calls and declarations. ([Code Consistently](#)).

```
// bad
function fight () {
  console.log ('Swoosh!');
}

// good
function fight()
{
  console.log('Swoosh!');
}
```

MCODE Style eliminates

- Set off operators with spaces.

```
// bad
var x=y+5;

// good
var x = y + 5;
```

- Leave a blank line after blocks and before the next statement. ([Code Consistently](#), [Code for Readability](#)).
- Note:** This rule makes no sense when 'Egyptian Brackets' are used.
- Never place more than one blank line between code lines of any type.**

```
// bad
if (foo) {
  return bar;
}
return baz;

// good
if (foo)
{
  return bar;
}

return baz;

// bad
var obj = {
  foo: function () {},
  bar: function () {}
};
return obj;

// good
var obj =
{
  foo: function () {},
  bar: function () {}
};

return obj;
```

MCODE Style eliminates



Types

- Use native data types for any variables that are not application specific or persistent. ([Code Simply](#)).

```
// bad
var x = {};
x.counter = 0;
for (x.counter = 0; x.counter < 99; x.counter++)
{
    // work
}

// good
for (let counter = 0; counter < 99; counter++)
{
    // work
}
```

- Use the simplest data structures possible. ([Code Simply](#)).



Objects

- Use the literal syntax for generic object creation. ([Code Simply](#)).

```
// bad
var item = new Object();

// good
var item = {};
```

- Don't use [reserved words](#) as keys. It won't work in IE8. [More info](#). ([Code Explicitly](#)).

```
// bad
var superman = {
  default: { clark: 'kent' },
  private: true
};

// good
var superman =
{
  alterEgo: { clark: 'kent' },
  hidden: true
};
```

- Use readable synonyms in place of reserved words. ([Code Explicitly](#)).

```
// bad
var superman = {
  class: 'alien'
};

// bad
var superman = {
  klass: 'alien'
};

// good
var superman =
{
  species : 'kryptonian'
};
```



Arrays

- Use the literal syntax for array creation. ([Code Simply](#)).

```
// bad
var items = new Array();

// good
var items = [];
```

- Use `Array.push` instead of direct assignment to add items to an array. ([Code Simply](#)).

```
var someStack = [];

// bad
someStack[someStack.length] = 'bohemianrhapsody';

// good
someStack.push('bohemianrhapsody');
```

- `.push` (add to end), `.pop` (remove from end) work on the **end** of the array
- `.unshift` (add to start), `.shift` (remove from start) work on the **start** of the array
- **Note:** `.shift` SHIFTS LEFT, `.unshift` SHIFTS RIGHT



Strings

- Use single quotes `'` for strings, even though double-quotes `"` are allowed. ([Code Consistently](#)).

```
// bad
var name = "Bob Parr";

// good
var name = 'Bob Parr';

// bad
var fullName = "Bob " + this.lastName;

// good
var fullName = 'Bob ' + this.lastName;
```

- Why? Because JavaScript functions are often building HTTP or CSS code that has embedded double-quoted values which must be double-quoted.

```
ui.result =
  <div class="card text-white bg-success mb-3" style="max-width: 40rem;">
    <div class="card-header" id="resultTitle">Result Display</div>
    <div class="card-body">
      <h5 class="card-title">Transaction Completed</h5>
      <label for="outputResult" class="col-sm-40 col-form-label">Result</label>
      <div class="col-sm-40">
        <input type="text" id="outputResult" value="<result>">
      </div>
    </div>
  </div>;
```



Functions

- Always use Named Function expressions. ([Code Consistently](#), [Code Explicitly](#)).
- **Note:** It helps when viewing stack-traces during debugging.

```
// anonymous function expression
var anonymous = function()
{
    return true;
};

// named function expression
var named = function named()
{
    return true;
};
```

- Never name a parameter “[arguments](#)”. This will take precedence over the [arguments](#) object that is given to every function scope. ([Code Explicitly](#)).

```
// bad
function dontDoThis(name, options, arguments) {
    // ...stuff...
}

// good
function thisIsOk(name, options, qualities)
{
    // ...stuff...
}
```



Properties

- Use **dot** notation when accessing properties by name. ([Code Simply](#), [Code Consistently](#), [Code for Readability](#)).

```
var luke = {  
  jedi: true,  
  age: 28  
};  
  
// bad  
var isJedi = luke['jedi'];  
  
// good  
var isJedi = luke.jedi;
```

- Use **bracket notation** [] when accessing properties with a variable. ([Code Explicitly](#)).

```
var luke = {  
  jedi: true,  
  age: 28  
};  
  
function getProp(prop)  
{  
  return luke[prop];  
}  
  
var isJedi = getProp('jedi');
```



Variables

- Always use `const` or `let` to declare variables. Not doing so will result in global variables. We want to avoid polluting the global namespace. Globals should only be used for app 'context', or 'common memory', usually loaded from a preferences files, settings files, or app 'memory' files. ([Code Explicitly](#)).

```
// bad - automatic global created
superPower = new SuperPower();

// good - local and 'readonly'
const superPower = new SuperPower();
```

- Use one `const` or `let` declaration per variable or assignment. ([Code Simply](#), [Code Explicitly](#)).

Why? It's easier to add new variable declarations this way, and you never have to worry about swapping out a `;` for a `,` or introducing punctuation-only diffs. You can also step through each declaration with the debugger, instead of jumping through all of them at once.

```
// bad
const items = getItems(),
      goSportsTeam = true,
      dragonball = 'z';

// bad
// (compare to above, and try to spot the mistake)
const items = getItems(),
      goSportsTeam = true;
      dragonball = 'z';

// good
const items = getItems();
const goSportsTeam = true;
const dragonball = 'z';
```



- Group all your **const** and then group all your **let**. ([Code for Readability, Code Consistently](#)).
- See **Appendix MicroCODE JS Code Ordering under JS Class Structure**

Why? This is helpful later on you might need to assign a variable depending on one of the previously assigned variables.

```
// bad
let i, len, dragonball,
    items = getItems(),
    goSportsTeam = true;

// bad
let i;
const items = getItems();
let dragonball;
const goSportsTeam = true;
let len;

// C O N S T A N T S -- good
const goSportsTeam = true;
const items = getItems();

// F I E L D S -- good
let dragonball;
let i;
let length;
```

MCODE Style eliminates



Comparison Operators & Equality

- Use `===` and `!==` over `==` and `!=`. ([Code Explicitly](#)).
- Conditional statements such as the `if` statement evaluate their expression using coercion with the `.ToBoolean` abstract method and always follow these simple rules:
 - **Objects** evaluate to **true**
 - **Undefined** evaluates to **false**
 - **Null** evaluates to **false**
 - **Booleans** evaluate to **the value of the boolean**
 - **Numbers** evaluate to **false** if **+0, -0, or NaN**, otherwise **true**
 - **Strings** evaluate to **false** if an empty string "", otherwise **true**

```
if ([0]) {  
  // true  
  // An array (even an empty one) is an object, objects evaluate to true  
}
```

- Use shortcuts for **Booleans**, but explicit comparisons for strings and numbers. For more information see [Truth Equality and JavaScript](#) by Angus Croll. ([Code Simply](#), [Code Explicitly](#)).

```
// bad - boolean  
if (isValid === true) {  
  // ...stuff...  
}  
  
//good - boolean  
if (isValid)  
{  
  //...stuff  
}  
  
// bad - string  
if (name) {  
  //...stuff  
}  
  
// good - string  
if (name !== '') or if (name.length > 0)  
{  
  //...stuff  
}  
  
// bad - array  
if (collection.length) {  
  //...stuff  
}  
  
// good - array  
if (collection.length > 0)  
{  
  //...stuff  
}
```



Blocks

- ~~Use~~ Always use code blocks in braces ~~with all multi-line blocks~~ for conditionals. (Code Consistently).
- See **MicroCODE: Indents, Braces, Blocks, and Aligned-Code**.

```
// bad
if (test)
  return false;

// bad
if (test) return false;

// good
if (test)
{
  return false;
}

// bad
function () { return false; }

// good
function ()
{
  return false;
}
```

MCODE Style eliminates

- ~~If you're using~~ When using ~~multi-line blocks with if~~ and ~~else~~, put ~~else on the same line as your if block's closing brace~~ on a new line, aligned with the ~~if~~. (Code Consistently).
- See **MicroCODE: Indents, Braces, Blocks, and Aligned-Code**.

```
// bad
if (test) {
  thing1();
  thing2();
} else {
  thing3();
}

// good - this will always be easier to read and maintain than the above
if (test)
{
  thing1();
  thing2();
}
else
{
  thing3();
}
```

MCODE Style eliminates



Commas

- Leading commas: **Nope.** ([Code for Readability](#)).
- What barbarian would ever do this?

```
// bad
var story = [
  once
  , upon
  , aTime
];

// good
var story =
[
  once,
  upon,
  aTime
];

// bad
var hero = {
  firstName: 'Bob'
  , lastName: 'Parr'
  , heroName: 'Mr. Incredible'
  , superPower: 'strength'
};

// good
var hero =
{
  firstName: 'Bob',
  lastName: 'Parr',
  heroName: 'Mr. Incredible',
  superPower: 'strength'
};
```



- Additional trailing comma: **Nope**. This can cause problems with IE6/7 and IE9 if it's in quirksmode. Also, in some implementations of ES3 would add length to an array if it had an additional trailing comma. This was clarified in ES5 ([source](#)):

Edition 5 clarifies the fact that a trailing comma at the end of an Array Initializer does not add to the length of the array. This is not a semantic change from Edition 3, but some implementations may have previously misinterpreted this.

- While it's tempting to leave the last comma to making adding future items easier the last trailing comma misleads the compiler/interpreter, and you never want to do that. ([Code Explicitly](#)).

```
// bad
var hero = {
  firstName: 'Kevin',
  lastName: 'Flynn',
};

var heroes = [
  'Batman',
  'Superman',
];

// good
var hero =
{
  firstName: 'Kevin',
  lastName: 'Flynn'
};

var heroes =
[
  'Batman',
  'Superman'
];
```



Semicolons

- **Yup.** ([Code Explicitly](#)).
- Just get used to semicolons, otherwise you are relying on the compiler/interpreter to figure out what you wanted across multiple lines of code. And sometimes it will make a different decision than you will.

```
// bad - raises exception
const luke = {}
const leia = {}
[luke, leia].forEach((jedi) => jedi.father = 'vader')

// bad - raises exception
const reaction = "No! That's impossible!"
(async function meanwhileOnTheFalcon() {
  // handle `leia`, `lando`, `chewie`, `r2`, `c3p0`
  // ...
})();

// bad - returns `undefined` instead of the value on the next line - always happens when
// `return` is on a line by itself because of ASI!
function foo() {
  return
  'search your feelings, you know it to be foo'
}

// good
const luke = {};
const leia = {};
[luke, leia].forEach((jedi) => {
  jedi.father = 'vader';
});

// good
const reaction = "No! That's impossible!";
(async function meanwhileOnTheFalcon() {
  // handle `leia`, `lando`, `chewie`, `r2`, `c3p0`
  // ...
})();

// good
function foo() {
  return 'search your feelings, you know it to be foo';
}
```



Naming Conventions

- Avoid single letter names. Be descriptive with your naming. ([Code Explicitly](#), [Code for Readability](#)).

```
// bad
function q() {
  // ...stuff...
}

// good
function sizeQuery()
{
  // ..stuff..
}
```

- Use **camelCase** when naming **objects**, **functions**, and **instances**. ([Code for Readability](#)).

```
// bad
var OBJEcttsssss = {};
var this_is_my_object = {};
var o = {};
function c() {}

// good
var thisIsMyObject = {};
function thisIsMyFunction() {}
```

- Use **PascalCase** when naming **classes**. ([Code for Readability](#)).

```
// bad
class user {
  constructor(options) {
    this.name = options.name;
  }
}

var bad = new user({
  name: 'nope'
});

// good
class User
{
  constructor(options)
  {
    this.name = options.name;
  }
}

var user = new User(
{
  name: 'yup'
});
```



- Name your functions. This is helpful for stack traces. ([Code Explicitly](#), [Code for Readability](#)).
- **Note:** IE8 and below exhibit some quirks with named function expressions. See <http://kangax.github.io/nfe/> for more info.

```
// bad
var log = function (msg) {
  console.log(msg);
};

// good
var log = function log(msg)
{
  console.log(msg);
};
```

- Start PRIVATE METHOD names within a Class with an '_' (Underscore).
- And document the method as `@api private` in the method header.

```
// METHODS - PRIVATE
/**
 * _method1() - description of private method.
 *
 * @param1 {type} description of param1.
 * @returns {type} description of return value.
 * @api private
 */
_method1(param1)
{
  // ...

  return value;
}
```

- Start all PRIVATE FIELD names within a Class with a '#' (Pound Sign / Hash).

```
// PRIVATE FIELDS
#property1 = 0.00;
#property2 = '';

// CONSTRUCTOR
constructor(objectName)
{
  this.type = CLASS_TYPE;
```

- Make all CONSTANTS UPPERCASE and **static**

```
// CONSTANTS
static MIN_VALUE = 1;
static MAX_VALUE = 999;
static CLASS_TYPE = 'Example';
```



Common Patterns

Note: Value comparisons, test variable against a limit, not a limit against a variable...
(This is known as a '**Yoda Conditional**' and is like saying "if blue is the sky"). ([Code for Readability](#)).

Use...

```
if (ObjectBeingTested == TestValue)
{
    ...
}
```

Not...

```
if (TestValue == ObjectBeingTested)
{
    ...
}
```

Example:

Use...

```
if (Object == null)
{
    ...
}
```

Not...

```
if (null == Object)
{
    ...
}
```

Reason:

The habit of placing the Object being tested first matches the way we speak, "If the object is null" and it makes ordered comparisons logically correct like this...

Use...

```
if (Object >= LowLimit)
{
    ...
}
```

Not...

```
if (LowLimit <= Object)
{
    ...
}
```




Code Maintenance


Follow a consistent procedure for editing released code. ([Code Consistently](#)).

1 – Follow a 'Quality Control Checklist' as you build and document a Release or Hot Fix.

Don't wait until you are done to 'pencil whip' the form, it is meant to be used as you go through the process.

 MicroCODE App Release Process Quality Control Checklist	
Background This defines the steps to successfully release MicroCODE Apps to Clients. App: Control (EPP) Build: v2.0.1 b (9)	STEP 6a: Document--with user requirements--the NEW FEATURES being added. These go into the RELEASE NOTES at the end under "New in Version vM.m.R c (B)" Document the Test Cases. STEP 6b: Document--with screen shots if helpful--the CORRECTED ISSUES being resolved. These go into the RELEASE NOTES at the end under "Correct in Version vM.m.R c (B)" Document the Test Cases. NOTE: Both 'New' and 'Corrected' go into the Release Notes regardless. If nothing changed note "No features were added" or "No issues were corrected".
PREPARATION STEP 1: Make a copy of the most recent INTERNAL source code tree. <u>Do not edit a stored copy of the 'Internal' source code tree.</u> STEP 2: Rename it 'D:\MicroCODE\Internal' -- all coding tools reference this path.	

The Checklist should include documentation templates for the README.md, Release Notes and Test Cases...

MicroCODE App Release Process Quality Control Checklist 	
New in Version vM.m.R c (B) The following features were added in this Release: 1) Requirement: ... Implementation: ... TEST CASES: These software tests were performed prior to release to ensure App functionality. Test Case N: ... – Passed. Test Case N: ... – Conditional. Test Case N: ... – Failed.	Corrected in Version VM.m.R c (B) The following defects were fixed this Release: 1) Issue: ... Correction: ... TEST CASES: These software tests were performed prior to release to ensure App functionality. Test Case N: ... – Passed. Test Case N: ... – Conditional. Test Case N: ... – Failed.



Appendix A: MicroCODE JS Class Structure

According to the [ES6 Rules Documentation](#)—and most JavaScript Style Guides—the ordering of the Class elements is shown below. This is the ordering enforced by the MicroCODE JS Class Template. ([Code Explicitly](#), [Code for Readability](#), [Code for Readability](#)).

Within a **class** (`ClassName`) group **datatypes** in this order:

- Constant Variables/Fields (`const`)
- Fields (`let`)
- Constructor (`constructor`)
- Enums (`const Object.freeze({})`)
- Properties (`get`, `set`)
- Iterators (`[Symbol.*]`)
- Methods (`methodName(param)`)
- Nested Classes

Within each of **type** group order by **access**:

- public
- private

Within each of the **access** groups, order by **static**, then **non-static**:

- static
- non-static

Within each of the **static/non-static** groups of fields, order by **readonly**, and then **non-readonly**:

- readonly
- non-readonly

e.g.: The methods section then would be unrolled in this order:

- public static methods
- public methods
- private static methods
- private methods



JS Class Structure (MicroCODE)

`mcodeTemplate` is technically a function (the one that we provide as constructor), while methods, getters and setters are written to `mcodeTemplate.prototype`. Below is our actual JavaScript Class Template file used to start all new JS Classes in our projects. ([Code Consistently](#)).

This template is built with **Code Folding** support through use of “`// #region`” and “`// #endregion`”. This will seem like a lot of unnecessary ‘syntactic sugar’—I hate that phrase BTW—reading through the following and understanding what it enables in VS CODE should make the value clear. Start with the entire file ‘folded’ to Class level. “`CTRL+K=>>>`”.

```

1 // #region H E A D E R
2 // <copyright file="mcodeTemplate.js" company="MicroCODE Incorporated">Copyright © 2022 MicroCODE Inc
3 // #region P R E A M B L E
4 // #region D O C U M E N T A T I O N...
72 // #endregion
73 // #endregion
74
75 // #region C L A S S
76
77 /**
78  * @class mcodeTemplate Class to represent a specific...
79  *
80  */
81 class mcodeTemplate
82 {
83 > // #region C O N S T A N T S...
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91 > // #region P R I V A T E   F I E L D S...
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97 > // #region C O N S T R U C T O R...
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114 > // #region E N U M E R A T I O N S...
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123 > // #region P R O P E R T I E S...
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151 > // #region S Y M B O L S...
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315
316 // #endregion
317
318 // #region E X T E N D E D   C L A S S E S
319
320 /**
321  * @class mcodeExtended Class extending mcodeTemplate...
322  *
323  */
324 class mcodeExtended extends mcodeTemplate
325 {
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```

Our custom shortcut:
Fold to MCODE
Class Level Regions
“`CTRL+K=>>>`”

Then ‘unfold’ the area you are working my clicking the “`>`” for that Region.

```

157 > // #region P R O P E R T I E S...
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164 > // #region S Y M B O L S...
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176 > // #region M E T H O D S - S T A T I C...
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199 > // #region M E T H O D S - P U B L I C...
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251 > // #region M E T H O D S - G E N E R A T O R S...
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281 > // #region M E T H O D S - P R I V A T E...
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316 // #endregion
317
318 // #region E X T E N D E D   C L A S S E S
319
320 /**
321  * @class mcodeExtended Class extending mcodeTemplate...
322  *
323  */
324 class mcodeExtended extends mcodeTemplate
325 {
326 > // #region C O N S T R U C T O R
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```



This leaves everything you are not working on 'hidden' via the 'folded code' support in VS Code.

```

118 >
119 > // #region ENUMERATIONS...
136 >
137 > // #region PROPERTIES...
164 >
165 > // #region SYMBOLS...
176 >
177 > // #region METHODS - STATIC
178 >
179 > /**
180 * static1() - description of public static method, called by prototype not object.
181 * This does not operate on a specific copy of a Class object.
182 * @api public
183 *
184 * @param {type} param1 description of param1.
185 * @returns {type} description of return value.
186 *
187 * @example
188 *
189 *     static1('param1');
190 */
191 > static static1(param1)
192 {
193     // ...
194
195     return value;
196 }
197
198 // #endregion
199 >
200 > // #region METHODS - PUBLIC...
264 >
265 > // #region METHODS - GENERATORS...

```

All the 'code folding' can be opened with... "CTRL+K=>J".

```

JS mcodeTemplate.js x
D:\> MicroCODE > Coding > JavaScript Templates > JS mcodeTemplate.js > mcodeTemplate
57 *
58 *     MODIFICATIONS:
59 *     -----
60 *
61 *     Date:          By-Group:  Rev:      Description:
62 *
63 *     02-Feb-2022    TJM-MCODE   {0001}    New module for common reusable Javascript Classes for code
64 *     06-Feb-2022    TJM-MCODE   {0002}    Moved @api tag under method description and before @param
65 *     08-Feb-2022    TJM-MCODE   {0003}    Added @constructor, @property, @class, @enum,
66 *
67 *
68 */
69 "use strict";
70
71 // #endregion
72 // #endregion
73 // #endregion
74
75 // #region CLASS
76
77 /**
78 * @class mcodeTemplate Class to represent a specific...
79 *
80 */
81 class mcodeTemplate
82 {
83     // #region CONSTANTS
84
85     static MIN_VALUE = 1;
86     static MAX_VALUE = 999;
87     static CLASS_TYPE = 'Example';
88
89     // #endregion
90
91     // #region PRIVATE FIELDS
92     #property1 = 0.00;
93     #property2 = '';
94
95     // #endregion
96
97     // #region CONSTRUCTOR

```

Standard shortcut:
Unfold ALL Regions
"CTRL+K=>J"



Everything can be 'folded' to LEVEL 0 with... **"CTRL+K=>0"**.

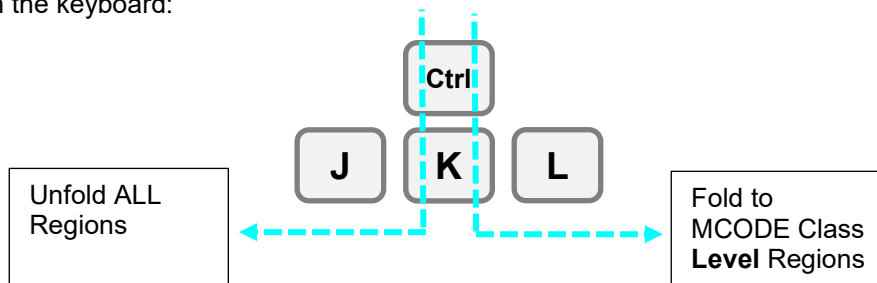
And you can restore your view of the overall Class structure (locked by **MCODE Style**) at any time with...

"CTRL+K=>J" **"CTRL+K=>3"**.

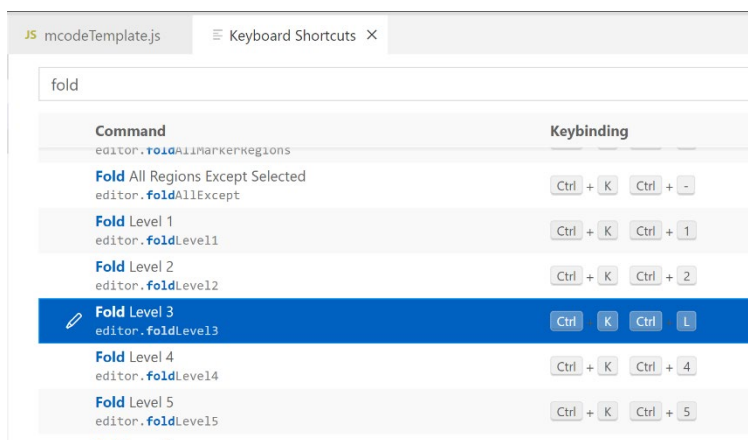
NOTE: You cannot get the same view with **"CTRL+K=>3"** without starting with **"CTRL+K=>J"**. These commands are 'relative' to the current view, not 'absolute'... i.e.: **"CTRL+K=>3"** will not always give you the same result by itself.

I use this all day every day when navigating files, so I have remapped **"CTRL+K=>L"** to equal **"CTRL+K=>3"**.

So, on the keyboard:



- File → Preferences → Keyboard Shortcuts



```
// #region H E A D E R
// <copyright file="mcodeTemplate.js" company="MicroCODE Incorporated">Copyright © 2022 MicroCODE Incorporated Troy,
MI</copyright><author>Timothy J. McGuire</author>
// #region P R E A M B L E
// #region D O C U M E N T A T I O N
/*
 * Title:      MicroCODE Common JavaScript Class Template
 * Module:     Modules (MicroCODE:mcodeTemplate.js)
 * Project:    MicroCODE Common Library
 * Customer:   Internal
 * Creator:    MicroCODE Incorporated
 * Date:       February 2022
 * Author:     Timothy J McGuire
 *
 * Designed and Coded: 2022 MicroCODE Incorporated
 *
 * This software and related materials are the property of
 * MicroCODE Incorporated and contain confidential and proprietary
 * information. This software and related materials shall not be
 * duplicated, disclosed to others, or used in any way without the
 * written of MicroCODE Incorporated.
 *
 * DESCRIPTION:
 * -----
 *
 * This module implements the MicroCODE's Common JavaScript Class Template.
 * This file is copied to start all MicroCODE JavaScript code files.
 *
 * REFERENCES:
 * -----
 *
 * 1. MIT xPRO Style Guide
 *    https://student.emeritus.org/courses/3291/files/2554233/download?wrap=1
 *
 * 2. AirBnB JavaScript Style Guide
 *    https://github.com/airbnb/javascript
 *
 * 3. Turing School Style Guide
 *    https://github.com/turingschool-examples/javascript/tree/main/es5
 *
 * 4. MDN Web Docs - JavaScript Classes
 *    https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Classes
 *
 * 5. JSDoc - How to properly document JavaScript Code.
 *    https://
 *
 * 4. MicroCODE MCX-S02 (Internal JS Style Guide).docx
 *
 * DEMONSTRATION VIDEOS:
 * -----
 *
 * 1. ...
 *
 * MODIFICATIONS:
 * -----
 *
 * Date:      By-Group:  Rev:      Description:
 *
 * 02-Feb-2022  TJM-MCODE  {0001}  New module for common reusable Javascript Classes for code files.
 * 06-Feb-2022  TJM-MCODE  {0002}  Moved @api tag under method description and before @param and @return.
 * 08-Feb-2022  TJM-MCODE  {0003}  Aded @constructor, @property, @class, @enum,
 *
 */
"use strict";

// #endregion
// #endregion
// #endregion

// #region C L A S S

/**
 * @class mcodeTemplate Class to represent a specific...
 */
class mcodeTemplate
{
    // #region C O N S T A N T S

    static MIN_VALUE = 1;
    static MAX_VALUE = 999;
    static CLASS_TYPE = 'Example';

```



```

// #endregion

// #region PRIVATE FIELDS
@property1 = 0.00;
@property2 = '';

// #endregion

// #region CONSTRUCTOR

/**
 * @constructor mcodeTemplate class constructor.
 *
 * @param {string} objectName the name of the object.
 */
constructor (objectName)
{
    this.type = CLASS_TYPE;
    this.name = objectName;
    this.enums = [];

    // ...
}

// #endregion

// #region ENUMERATIONS

/**
 * @enum namedEnum1 - a description of this enum, its use, and meaning.
 */
static namedEnum1 = Object.freeze
(
{
    name1: 0,
    name2: 1,
    name3: 2,
    name4: 3,
    name5: 4,
    name6: 5,
    name7: 6
}
));

// #endregion

// #region PROPERTIES

/**
 * @property {type} property1 a description of this property, its use, and meaning.
 */
get property1()
{
    return this.#property1;
}
set property1(value)
{
    this.#property1 = value;
}

/**
 * @property {type} property2 a description of this property, its use, and meaning.
 */
get property2()
{
    return this.#property2;
}
set property2(value)
{
    this.#property2 = value;
}

// #endregion

// #region SYMBOLS

/**
 * iterator1 - a description of this iterator, its use, and meaning.
 */
[Symbol.iterator]()
{
    // method with computed name (symbol here)
}

// #endregion

// #region METHODS - STATIC

/**
 * static1() - description of public static method, called by prototype not object.
 * This does not operate on a specific copy of a Class object.

```



```

* @api public
* @param {type} param1 description of param1.
* @returns {type} description of return value.
* @example
*
*     static1('param1');
*/
static static1(param1)
{
    // ...

    return value;
}

// #endregion

// #region METHODS - PUBLIC

/**
* method1() - description of public method.
* @api public
* @param {type} param1 1st method parameter.
* @returns method result.
* @example
*
*     method1('param1');
*/
method1(param1)
{
    // ...

    return value;
}

/**
* method2() - description of public method.
* @api public
* @param {type} param1 1st method parameter.
* @param {type} param2 2nd method parameter.
* @returns method result.
* @example
*
*     method2('param1', 'param2');
*/
method2(param1, param2)
{
    // ...

    return value;
}

/**
* method3() - description of public method.
* @api public
* @param {type} param1 1st method parameter.
* @param {type} param2 2nd method parameter.
* @param {type} param3 3rd method parameter.
* @returns {type} method result.
* @example
*
*     method3('param1', 'param2');
*/
method3(param1, param2, param3)
{
    // ...

    return value;
}

// #endregion

// #region METHODS - GENERATORS

/**
* getValue() - returns all values in 'enums'.
*
*/

```



```

*getValue()
{
    for (const enumValue of this.enums)
    {
        yield value;
    }
}

// #endregion

// #region METHODS - PRIVATE

/**
 * _method1() - description of private method.    NOTE: Method headers are *optional* for private methods.
 *
 * @api private
 *
 * @param {type} param1 description of param1.
 * @returns {type} description of return value.
 */
_method1(param1)
{
    // ...

    return value;
}

/**
 * _method2() - description of private method.
 *
 * @api private
 *
 * @param {type} param1 description of param1.
 * @returns {type} description of return value.
 */
_method2(param1)
{
    // ...

    return value;
}

// #endregion
}

// #endregion

// #region EXTENDED CLASSES

/**
 * @class mcodeExtended Class extending mcodeTemplate...
 *
 */
class mcodeExtended extends mcodeTemplate
{
    // #region CONSTRUCTOR

    constructor (name)
    {
        super(name); // call the super class constructor and pass in the name parameter
    }

    // #endregion

    // #region METHODS - PUBLIC

    /**
     * method9() -- ouputs the extended name of the Class.
     *
     */
    method9()
    {
        console.log(`${ this.name } communicates.`);
    }

    // #endregion
}

// #endregion

```



Appendix B: Visual Studio Code Settings

These are the VS Code settings recommended to maintain **MCODE Style** automatically.

- Automatic Spaces

Editor: Insert Spaces

- ☒ Insert spaces when pressing **Tab**. This setting is overridden based on the file contents when [Editor: Detect Indentation](#) is on.

Editor > Comments: Insert Space

- ☒ Controls whether a space character is inserted when commenting.

- When to auto-format

Editor: Format On Paste

- ☒ Controls whether the editor should automatically format the pasted content. A formatter must be available and the formatter should be able to format a range in a document.

Editor: Format On Save

- ☒ Format a file on save. A formatter must be available, the file must not be saved after delay, and the editor must not be shutting down.

Editor: Format On Save Mode

Controls if format on save formats the whole file or only modifications. Only applies when [Editor: Format On Save](#) is enabled.

file



Editor: Format On Type

- ☒ Controls whether the editor should automatically format the line after typing.



- JavaScript auto-formatting options (same for TypeScript)

JavaScript › Format: Enable

☒ Enable/disable default JavaScript formatter.

JavaScript › Format: Insert Space After Comma Delimiter

☒ Defines space handling after a comma delimiter.

JavaScript › Format: Insert Space After Constructor

☒ Defines space handling after the constructor keyword.

JavaScript › Format: Insert Space After Function Keyword For Anonymous Functions

☒ Defines space handling after function keyword for anonymous functions.

JavaScript › Format: Insert Space After Keywords In Control Flow Statements

☒ Defines space handling after keywords in a control flow statement.

JavaScript › Format: Insert Space After Opening And Before Closing Empty Braces

☒ Defines space handling after opening and before closing empty braces.

JavaScript › Format: Insert Space After Opening And Before Closing Jsx Expression Braces

☐ Defines space handling after opening and before closing JSX expression braces.

JavaScript › Format: Insert Space After Opening And Before Closing Nonempty Braces

☒ Defines space handling after opening and before closing non-empty braces.

JavaScript › Format: Insert Space After Opening And Before Closing Nonempty Brackets

☐ Defines space handling after opening and before closing non-empty brackets.

JavaScript › Format: Insert Space After Opening And Before Closing Nonempty Parenthesis

- JavaScript auto-formatting options (continued) (same for TypeScript)

JavaScript › Format: Insert Space After Opening And Before Closing Nonempty Parenthesis

☐ Defines space handling after opening and before closing non-empty parenthesis.

JavaScript › Format: Insert Space After Opening And Before Closing Template String Braces

☒ Defines space handling after opening and before closing template string braces.

JavaScript › Format: Insert Space After Semicolon In For Statements

☒ Defines space handling after a semicolon in a for statement.

JavaScript › Format: Insert Space Before And After Binary Operators

☒ Defines space handling after a binary operator.

JavaScript › Format: Insert Space Before Function Parenthesis

☐ Defines space handling before function argument parentheses.

JavaScript › Format: Place Open Brace On New Line For Control Blocks

☒ Defines whether an open brace is put onto a new line for control blocks or not.

JavaScript › Format: Place Open Brace On New Line For Functions

☒ Defines whether an open brace is put onto a new line for functions or not.

JavaScript › Format: Semicolons

Defines handling of optional semicolons. Requires using TypeScript 3.7 or newer in the workspace.

insert 



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