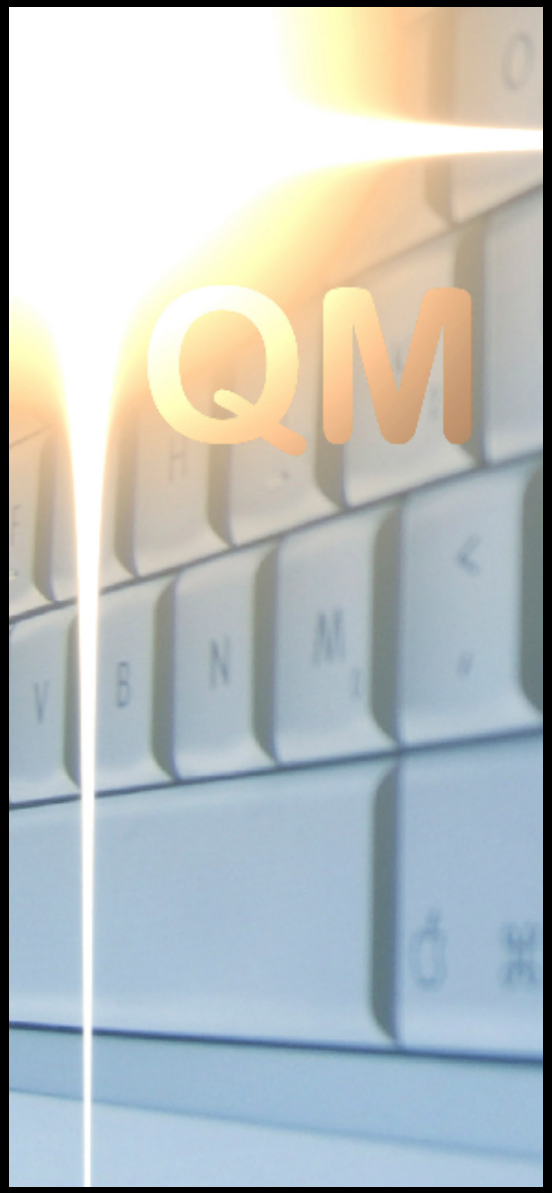

OpenQM

Object Oriented Programming

Martin Phillips
Ladybridge Systems Ltd

OpenQM

What's it all about?

What is an object?

Persistent data

Public subroutines and functions

Inheritance

Destructors and undefined name handlers

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What's It All About?

- OO programming does not replace "conventional" methods.
- A new addition to the developer's toolbox.
- An integral part of the QMBasic language.

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What Is An Object?

Subroutine:

Program operations that work on supplied data.

Object:

Data that has associated program operations.

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What Is An Object?

Defined by a CLASS module.

The CLASS module is a container for...

- The persistent data definitions.
- The program operations that run against this data.

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What Is An Object?

An object is a run time instance of the class.

var = OBJECT(“myobj.cls”)

There may be many concurrent instances of the same class each with their own data.

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The Objref Operator (->)

References an element of the object.

var->name

var->(*expr*)

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Persistent Data

Class modules may use common blocks but these are shared across all instances of the class.

Class modules also have persistent data that is separate for each instance.

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Persistent Data

Private data...

- Not visible outside the class module.
- Hides internal operation of the object.

PRIVATE A, B, C(2,3)

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Persistent Data

Public data...

- May be visible to programs using the object.

PUBLIC P, Q, R(2,3)

PUBLIC X READONLY

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Persistent Data

Referenced from calling program:

result = var->item

var->item = 12

var->item(3) = 12

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Public Subroutines and Functions

- Program operations contained within the class module.
- May access or update persistent data.
- Public subroutines store values or perform tasks.
- Public functions return a result value.

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Public Subroutines and Functions

```
PUBLIC SUBROUTINE name
   ... Program operations ...
END
```

```
var->name
```

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Public Subroutines and Functions

```
PUBLIC SUBROUTINE name(a,b)
   ... Program operations ...
END
```

```
var->name(x,y)

var->name(x) = y
```

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Public Subroutines and Functions

```
PUBLIC FUNCTION name(a,b)
   ... Program operations ...
   RETURN value
END
```

```
p = var->name(q, r)
```

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Public Subroutines and Functions

Variable length named argument lists...

```
PUBLIC FUNCTION name(a,b) VAR.ARGS
   ... Program operations ...
   RETURN value
END
```

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Public Subroutines and Functions

Variable length unnamed argument lists...

```
PUBLIC FUNCTION name(a, ...)
   ... Program operations ...
   RETURN value
END
```

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Public Subroutines and Functions

Access arguments by position...

ARG.COUNT()

ARG(n)

SET.ARG n, value

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Dual Identity

A name may refer to a public data item when reading and program operations when writing...

...Or vice versa

Allows easy data validation or event triggers.

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Inheritance

One class may want to use the data and public routines of another.

The inherited class remains a “black box” where the outer class cannot see how it works.

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Inheritance

Static Inheritance...

CLASS name INHERITS other.class

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Inheritance

Dynamic Inheritance...

```
obj = object(“otherclass”)
INHERIT obj
```

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Inheritance

Dis-inheritance...

DISINHERIT obj

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“Automatic” Handlers

- CREATE.OBJECT
- DESTROY.OBJECT
- UNDEFINED (Subroutine / Function)

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“Automatic” Handlers

CREATE.OBJECT

Run when the object is instantiated.

Arguments to OBJECT() are passed to this subroutine.

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“Automatic” Handlers

- DESTROY.OBJECT
- Run when the last variable referencing the object is released.
- Guaranteed execution, even at program abort.

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“Automatic” Handlers

- UNDEFINED
- Run for references to undefined names.
- Both FUNCTION and SUBROUTINE can exist.
- Caller’s arguments passed, plus name.

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Example Class Module

This example will walk through a directory, returning the name and type of each item.

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Step 1 – Data Definitions

```
CLASS DIR.CLS
$CATALOGUE
    PRIVATE ENTRIES   ;* From DIR()
    PUBLIC ISDIR READONLY
END
```

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Step 2 – CREATE.OBJECT

```
PUBLIC SUBROUTINE CREATE.OBJECT(P)
    ENTRIES = DIR(P)
END
```

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Step 3 – Retrieve the next item name

```
PUBLIC FUNCTION NEXT
    NAME = ENTRIES<1,1>
    ISDIR = (ENTRIES<1,2> = 'D')
    DEL ENTRIES<1>
    RETURN NAME
END
```

```
CLASS DIR.CLS
$CATALOGUE
    PRIVATE ENTRIES         ;* From DIR()
    PUBLIC ISDIR READONLY ;* Is a directory?

    PUBLIC SUBROUTINE CREATE.OBJECT(PATH)
        ENTRIES = DIR(PATH)
    END

    PUBLIC FUNCTION NEXT
        NAME = ENTRIES<1,1>
        ISDIR = (ENTRIES<1,2> = 'D')
        DEL ENTRIES<1>
        RETURN NAME
    END
END
```

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Using the Class

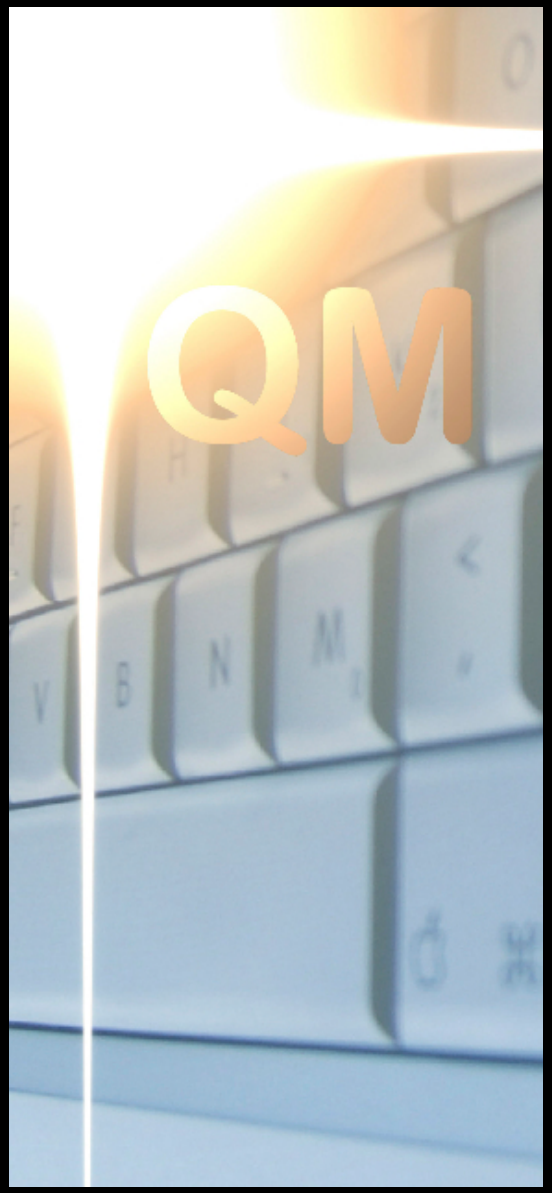
```
DIR = OBJECT('DIR.CLS', '\TEMP')
LOOP
    NAME = DIR->NEXT
UNTIL NAME = ''
    DISPLAY NAME
REPEAT
```

```
PROGRAM OBJECT.DEMO
   GOSUB SCAN(0, '\QMSYS')
   STOP

   LOCAL SUBROUTINE SCAN(INDENT, PATH)
      PRIVATE DIR

      DIR = OBJECT('DIR.CLS', PATH)
      LOOP
         NAME = DIR->NEXT
      UNTIL NAME = ''
         CRT SPACE(INDENT) : NAME
         IF DIR->ISDIR THEN
            GOSUB SCAN(INDENT + 3, PATH:'\'NAME)
         END
      REPEAT

      RETURN
   END
END
```



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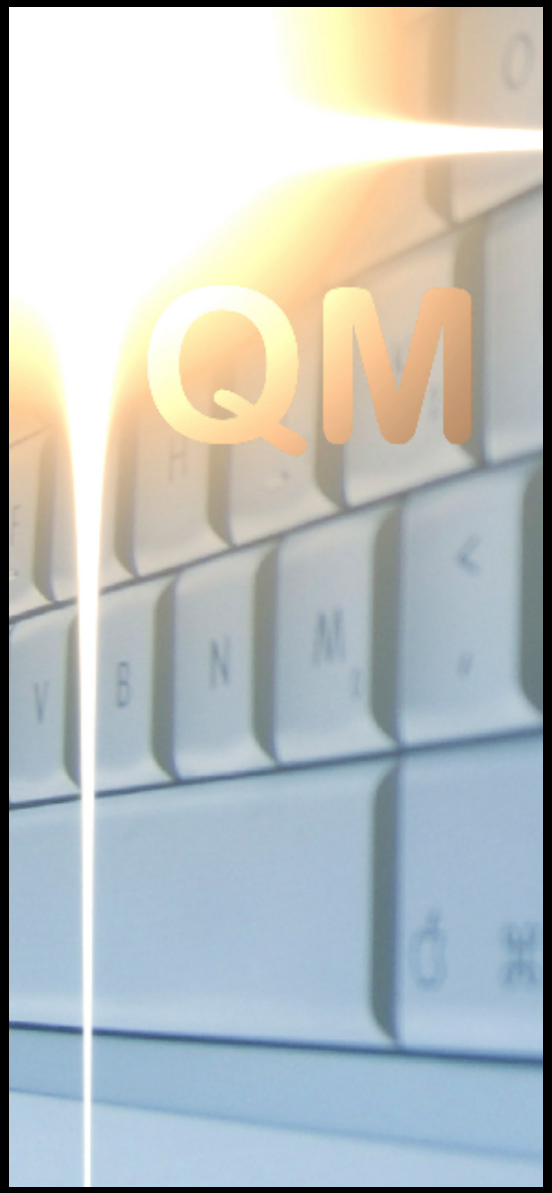
QUESTIONS?



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