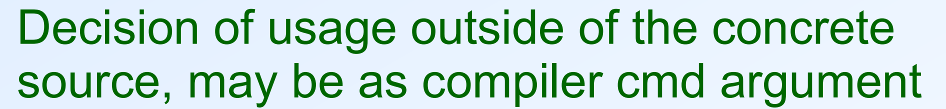
emC Usage of #define

#define in C has 2 intension:

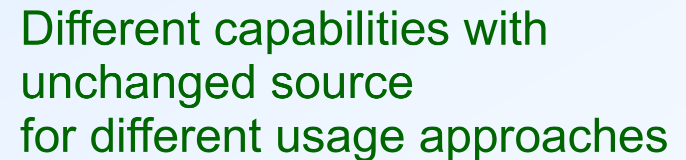
1) **controlling of parts in sources to compile (compile switch)**
2) **text replacement**

First intension:




```
#define DEF_REFLECTION_NO
…….

#ifdef DEF_REFLECTION_FULL
  #include <emC/Base/genRefl/Time_emC.crefl>
#endif
……
```



=>use a capability or not.

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First and second intension:

Explicit error message if a decision is not possible in the given context

```
#ifdef DEF_REFLECTION_FULL
  #error do not support DEF_REFLECTION_FULL
#elif DEF_REFLECTION_OFFS
  #define initReflection_ObjectJc(THIZ, ADDR, SIZE, REFL, IDENT)  \
   { (THIZ)->idInstanceType = ((IDENT)<<16) + ((REFL)->ixType & 0xffff); }
#else
  #define initReflection_ObjectJc(THIZ, ADDR, SIZE, REFL, IDENT) \
   { (THIZ)->idInstanceType = ((IDENT)<<16); }
#endif
……

void ctor_Clock_MinMaxTime_emC(Clock_MinMaxTime_emC* thiz, int nrofEntries) {
  initReflection_ObjectJc(&thiz->base.object, thiz, sizeof(*thiz)
      , &reflection_Clock_MinMaxTime_emC, 0);
```

Different perculiarity

with unchanged – same sources

emC Usage of #define

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Second intension: text replacement in style of an operation

Use paranthesis around arguments (!)

```
#define ARRAYLEN_emC(ARRAY) (sizeof(ARRAY) / sizeof((ARRAY)[0]))

……
//usage:
int myArray[] = { 1,2,3 };
int size = ARRAYLEN_emC(myArray);
```

* It is simple able to read and clarified
* An inline operation is not possible for that approach
* Do not count arguments in the source and use immediately numbers:
  int size = 3;

emC Usage of #define

Negative and positive pattern of #define

```
#ifdef PLATFORM_A
  dosomething(…);
  ...
#elif PLATFORM_B
#if DEF_XY
  doitother();
  ...
#else
  thirdVariant();
  ...
#endif
#endif
```

Different implementations, not the same concepts or slightly different

Any platform has its own intension, different
=>Only (de)selecting capabilities

Too many variants
=>It should have a concept

Nesting is bad

```
  #ifdef DEF_USE_INSPECTOR
    init_Inspc(...);
    ...
  #endif
```

A clear decision

The adequate clear content

emC Usage of #define

Writing style of #define

```
#ifdef DEF_REFLECTION_FULL
  ……
#endif //DEF_REFLECTION_FULL
```

Compiler switches should be start with DEF and upper case written. Do not use __DEF__ because gcc says „reserved keyword“

Mark the associated endif

Use paranthesis around arguments (!)

```
#define add_MyType(A,B) ( (A) + (B) )

inline int add_MyType(int a, int b)
{ return a+b; }
```

Usage a macro as operation: It is possible, advantage: type-variable.

Then write macro name in normal camelCase, it is an operation! Alternativly to an inline operation.

Advantage of inline: Better compiler error detection (inline in C since C99).
Advantage of macro: type-invariant, ignore arguments in special cases ...etc.

A macro should be well tested. Problems with usage possible.
A macro should not be too complex. It should be comprehensible.

emC Writing style in header

struct and class definition

Use typedef for C language

```
typedef struct MyType_T {
  /**Comment to element*/
  int32 val1;
  float val2;
  OtherType_s* aggregation;
} MyType_s;
```

Write the struct MyType_T with _T, using for forward declaration.

Write the C MyType_s with _s

```
int anyOperation_MyType(MyType_s* thiz, float arg);
```

Declare function prototypes accordingly to the data type, write „thiz“

```
#ifdef __cplusplus
class MyType : public MyType_s {
  int anyOperation(float arg) {
    anyOperation(this, arg);
  }
  …
}
```

Offer a class for C++ usage, it is better to handle, but with __cplusplus compilation condition
=> possible fall back to C for some usages.

offer the C function as class function.

C or C++, the question

Though C++ is available for the most embedded processors (for all) since 20 years more and more better, and C++ has taken a tutorial development
=>Some or many people attached to C. Why? Are they to old or stupid?

C is near to machine code.
A simple C++ is near to machine code too.
C is often used as meta language for code generation from graphical models.
Some or all C++ libraries are using dynamic memory.
It is worse for embedded, worse for safety long-running devices.
C++ is a language for PC programming and graphical applications (QT…),
The growth of C++ programs are for PC usage.
C++ with dynamic memory libraries has not so far experience in embedded
What about safety of a virtual table pointer inside the data for safety critical apps?

The discussion C vs C++ or a lightweight C++ for embedded is up to date.