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xUML Model Compiler Evaluation (DesignPoint) For Executable UML

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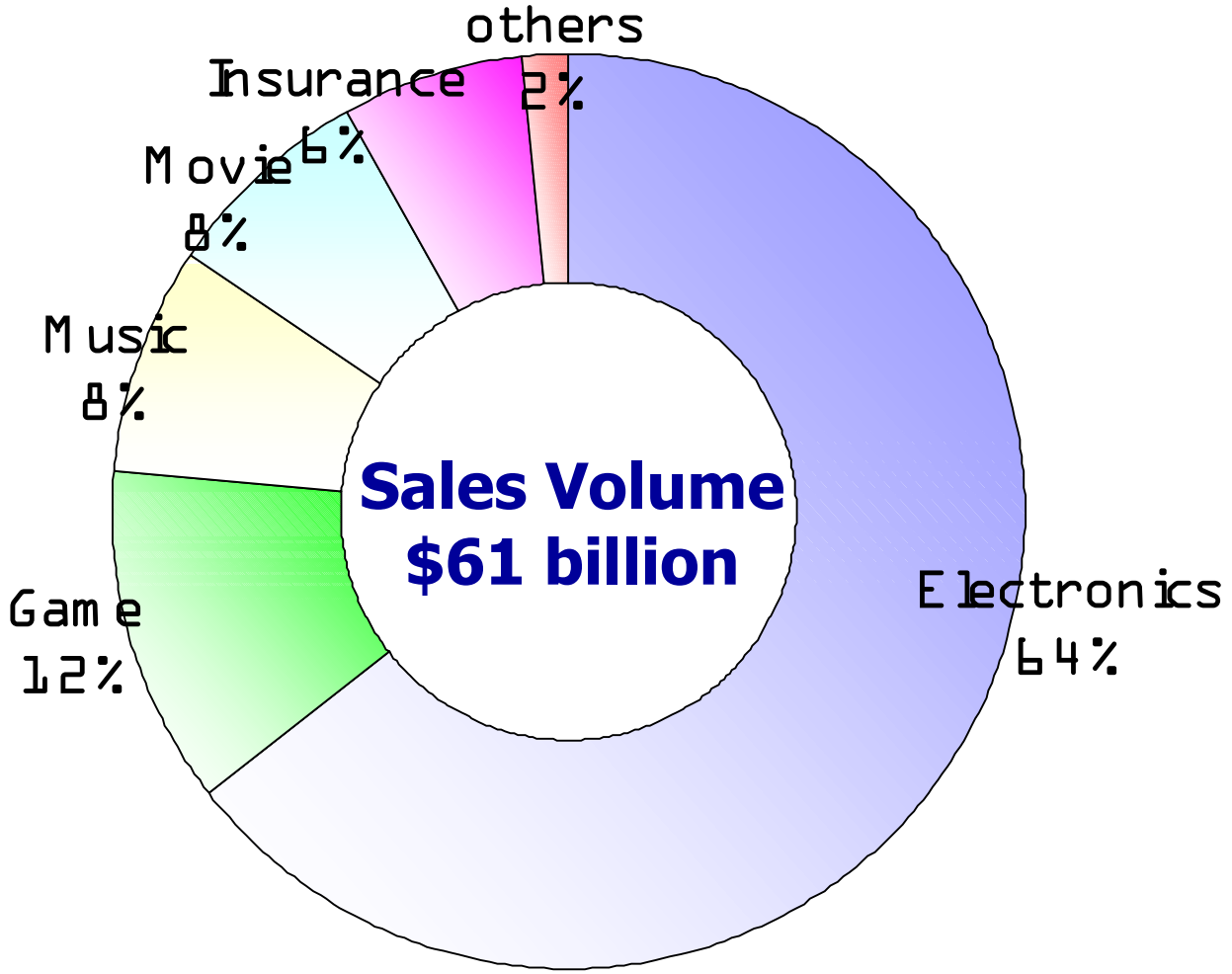
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agenda

- beginning
- purpose
- evaluation method
- improvement point
- conclusion
- future development

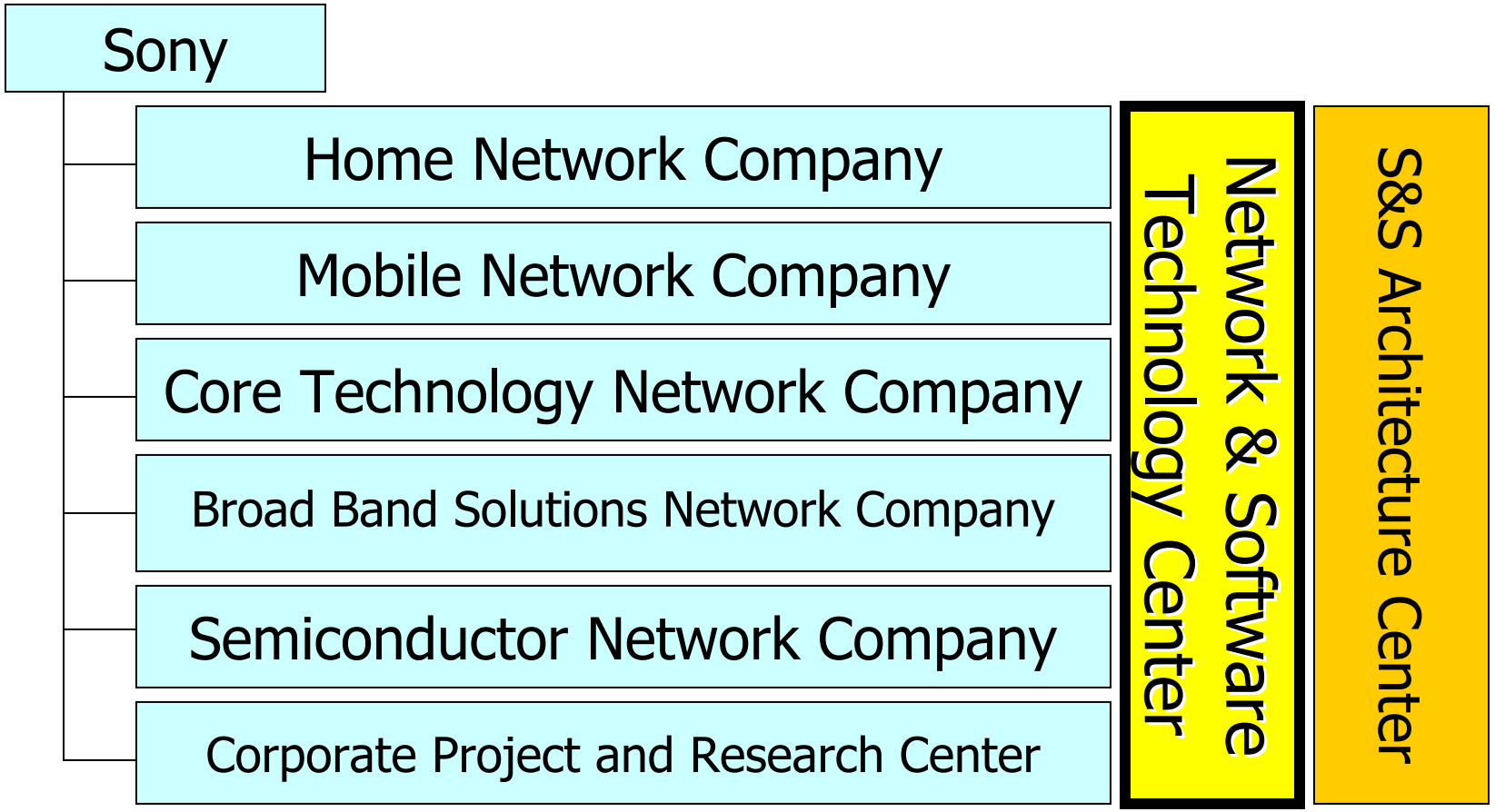
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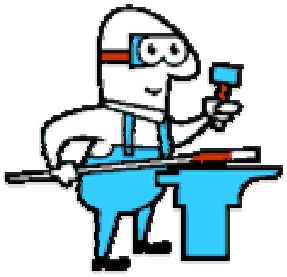
Organization

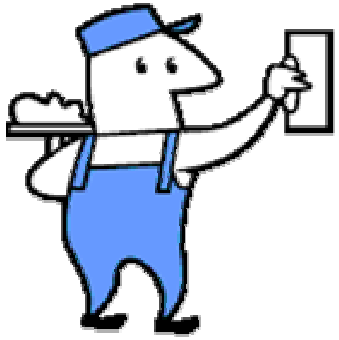


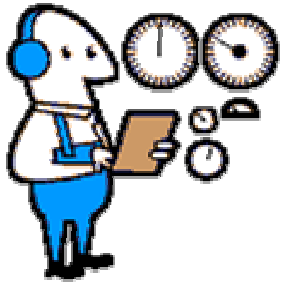
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Our Mission

- Creating some innovative solution for all Sony Network Company.
- Shearing the technology between Network Companies.







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background and purpose

- background
  - Performance of an UML model compiler is important to built real-time embedded systems on xUML technology.
  - We want to confirm utility of MC3020.
- purpose
  - Clarification of problems of MC2020 (improvement point).
  - Evaluation of utility of MC2020 for large scale embedded system.

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evaluation method

Comparing *.c and *.exe provided different way

- evaluation object
  - The handwriting code C++ that already exist.
    （ Handcoding of UML Model ）
  - The code provided by MC2020 from an UML model.
  - The code provided by MC3020 from an UML model.

- Evaluation point
  - Processing speed
  - Memory size

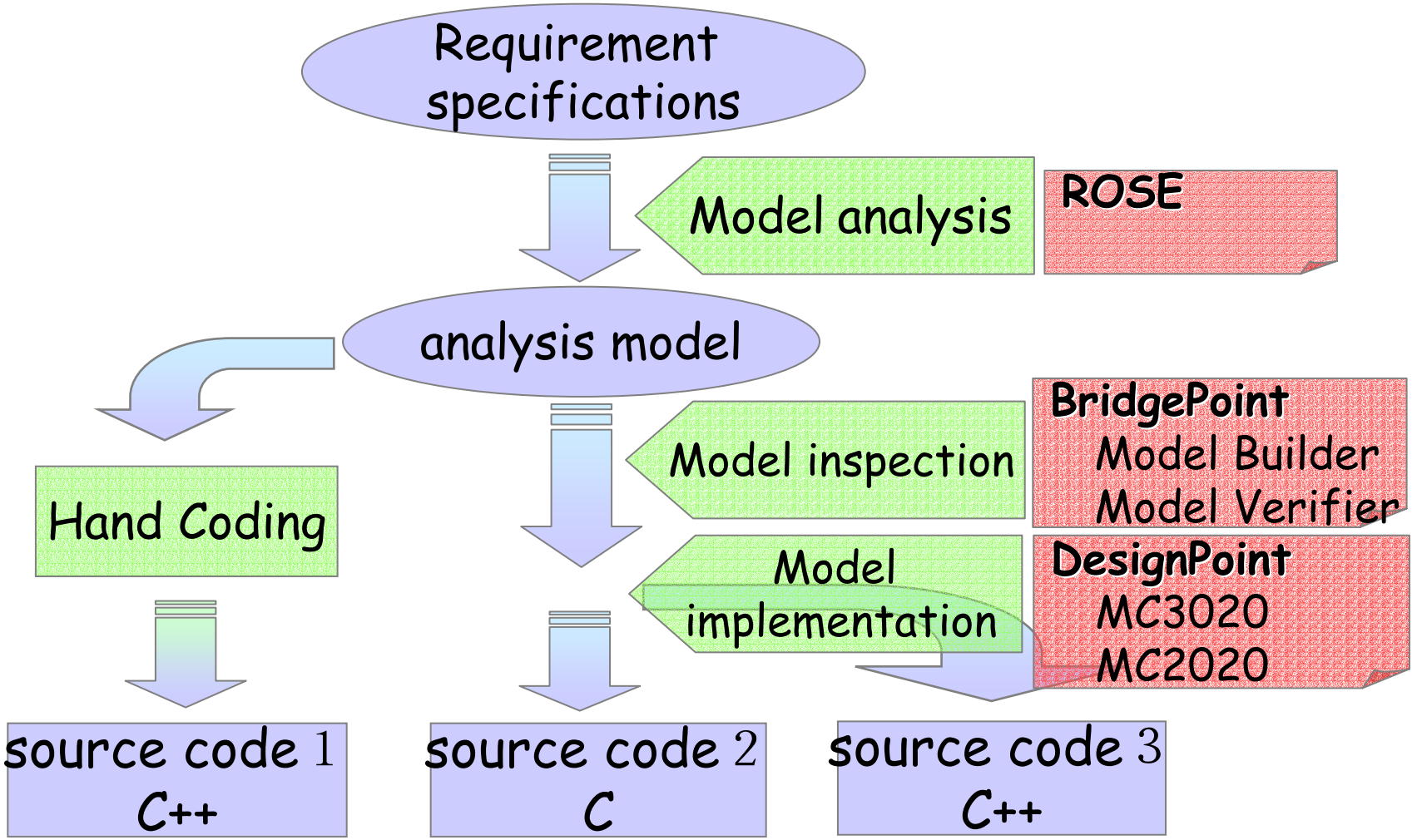
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Evaluation environment

- compiler
  - Gcc
- Target CPU
  - ARM 60MHz
  - BUS Width 16bit

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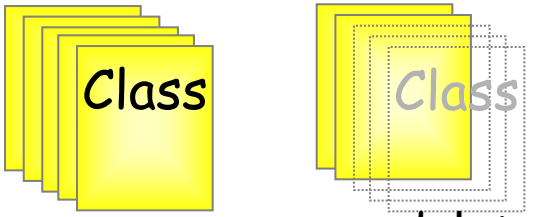
Process and Tools

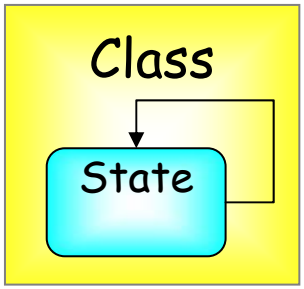


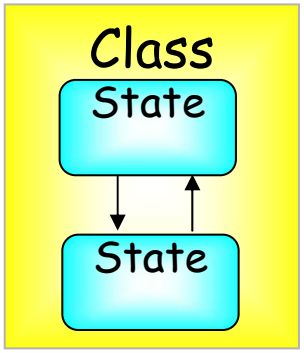
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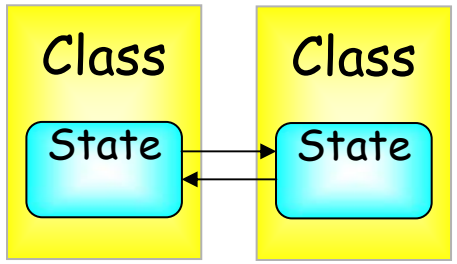
Evaluation point1 Processing speed

- new and delete of classes
  - 

    new + delete
    10,000Times
  - 

    new
    10,000Times
    delete
    10,000Times
- State transition
  - 

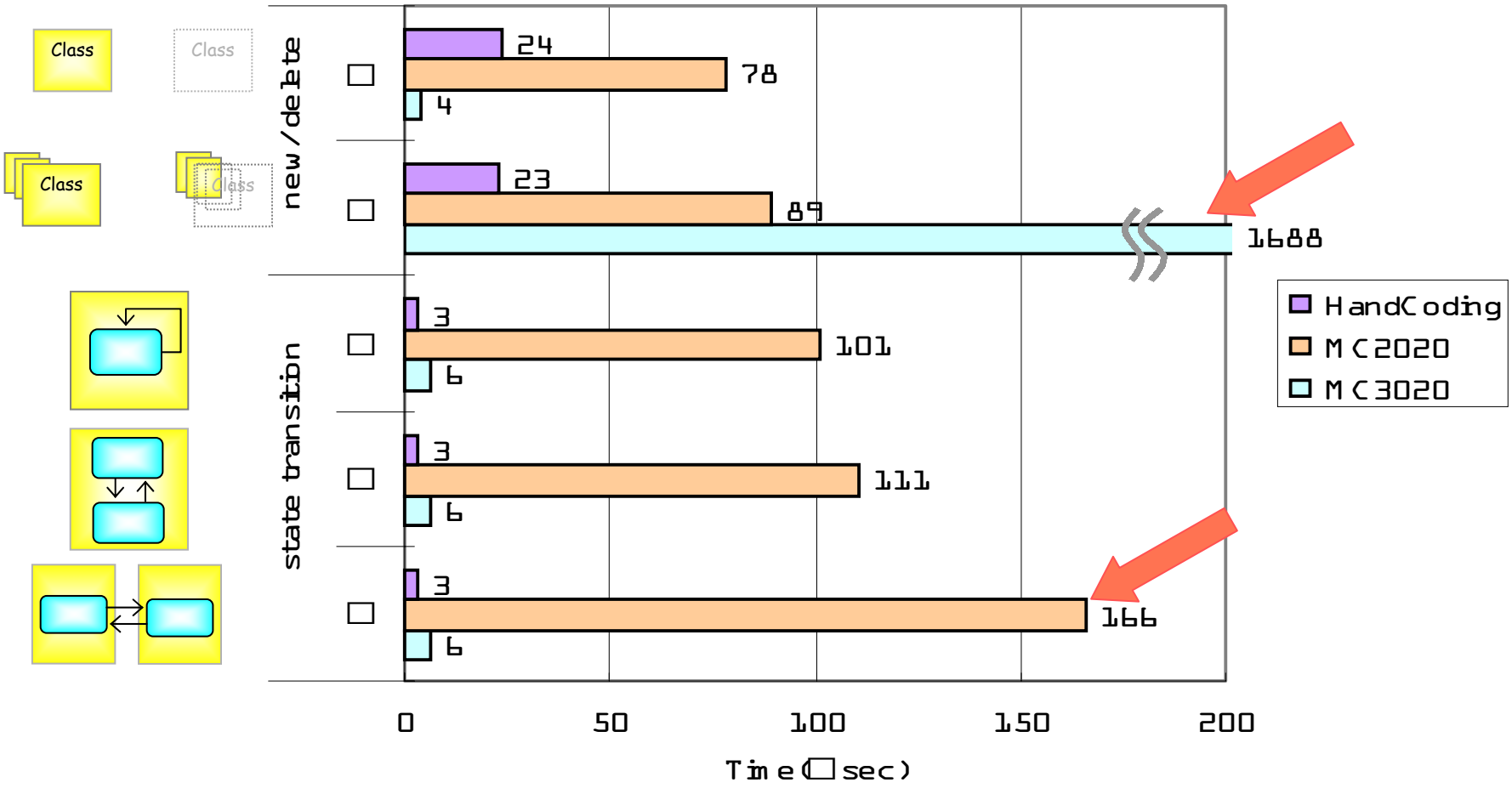
    same state
    10,000Times
  - 

    between different state
    10,000Times
  - 

    between different classes
    10,000Times

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Evaluation result **Processing speed**



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Evaluation point2 **Memory Size**

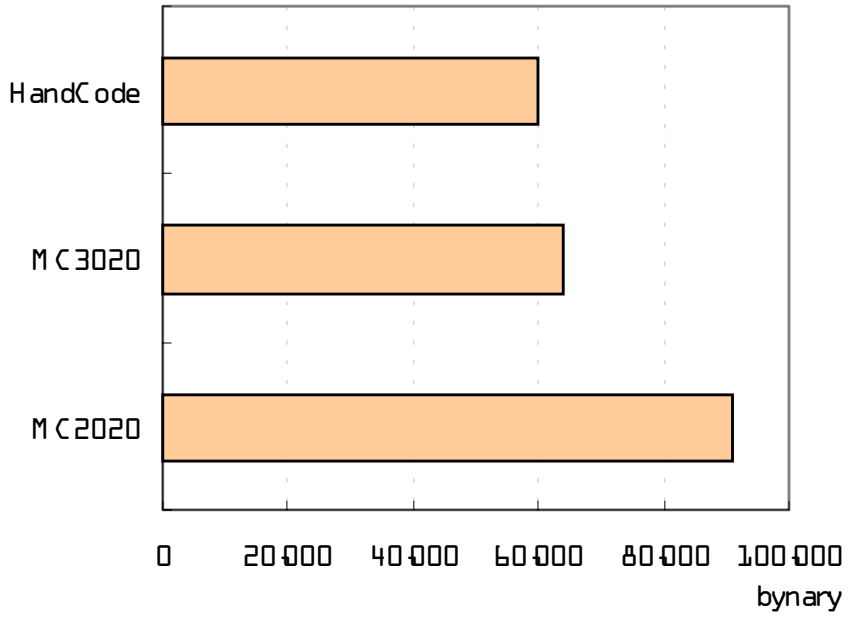
Model scale for evaluation

- Domains : 3
- Classes: 41
  - ActiveClasses : 13
  - PassiveClasses : 28
- States: 44
- Events: 42
- State transitions: 48
- Operations : 96

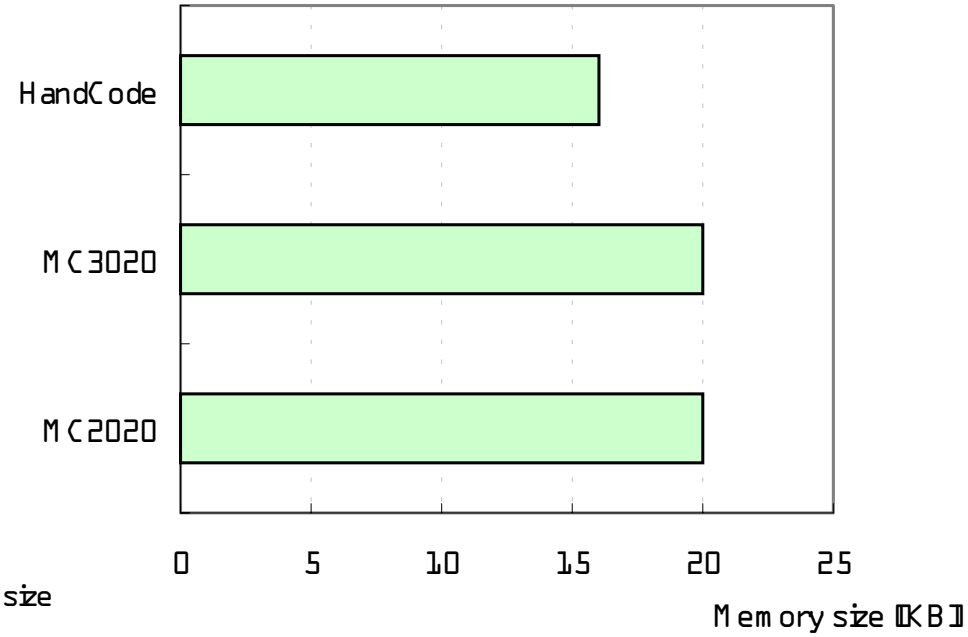
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Evaluation result **ROM/RAM size**

- ROMsize
  (binary size of exefile)



- RAMsize



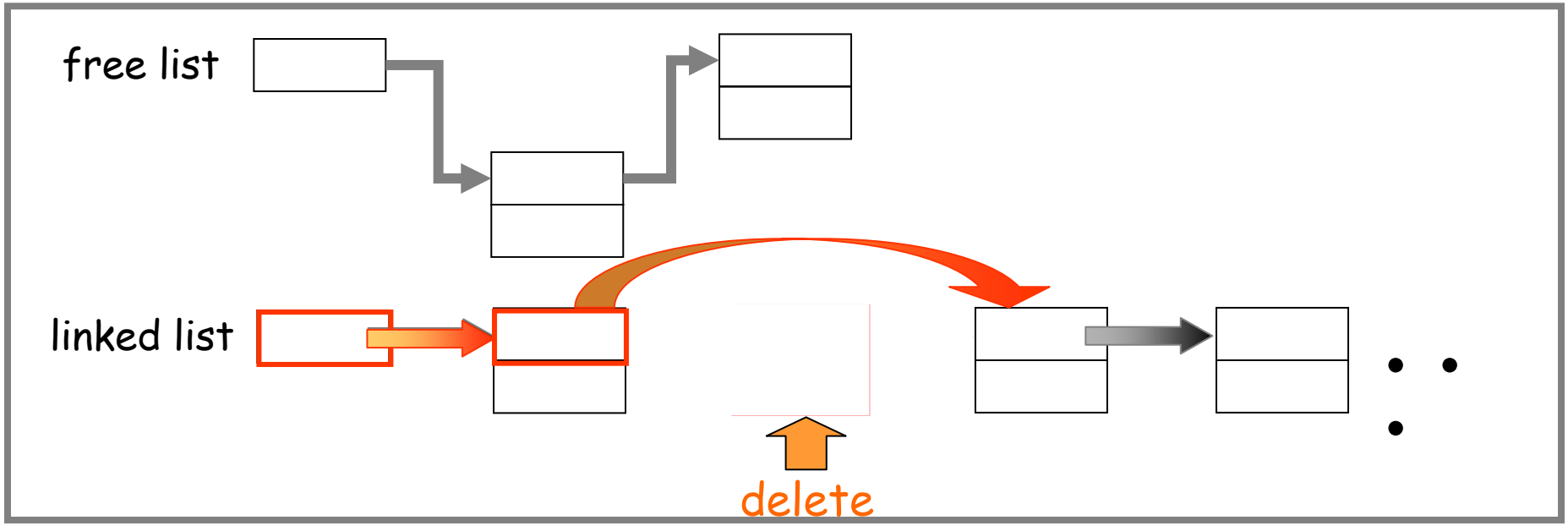
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Improvement plan

- **Processing speed**
  - management method of instance
  - new/delete method of event instance
- **Memory Size**
  - Optimization of an implementation class

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Speed improvement plan1
management method of instance



single linked list ⇒ interactive linked list

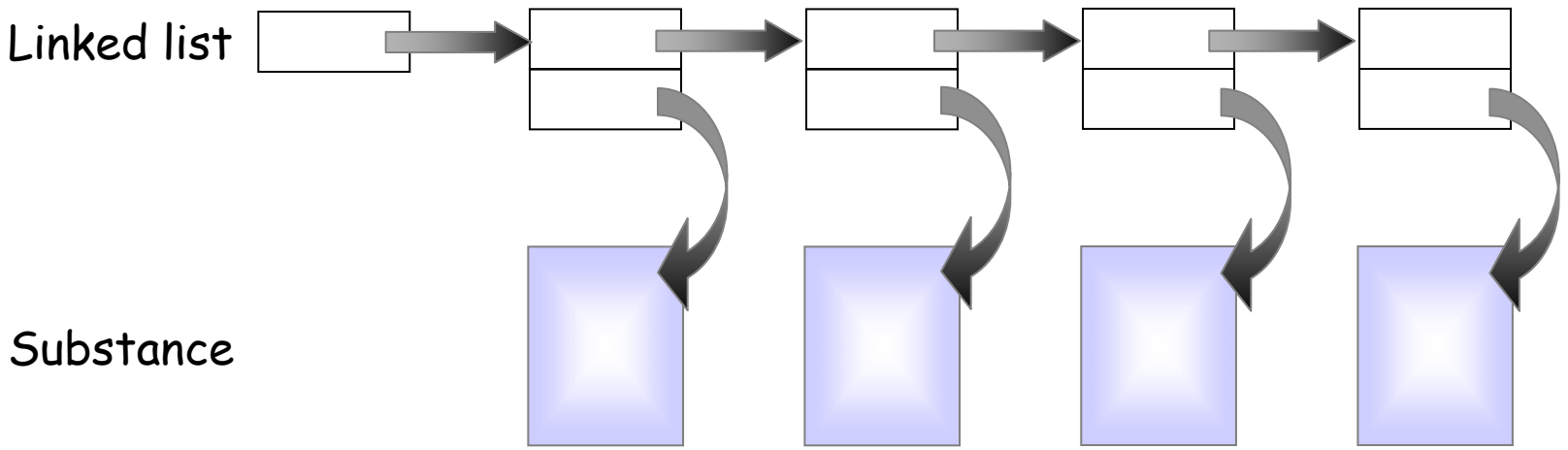
Choose structure of linked list at coloring files

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Speed improvement plan2
new/delete method of event instance

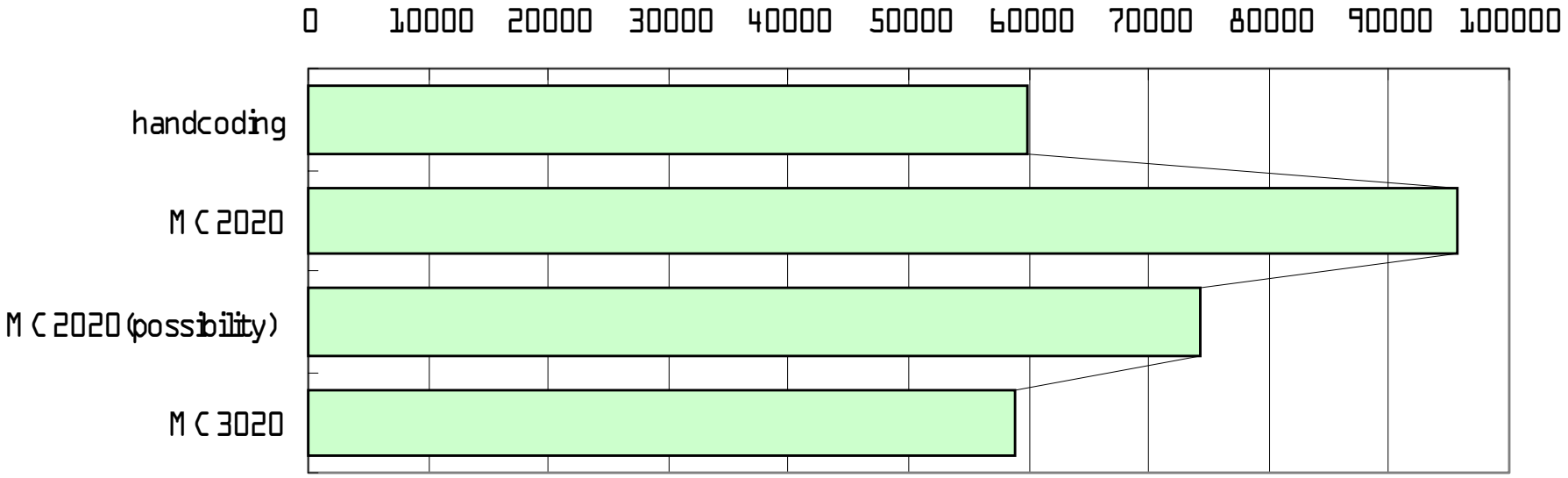
- **MC3020**
  - Generate instances in static
- **MC2020**
  - Generate instances in dynamic

It takes a time that Generate of substance and list



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Memory Size improvement plan possibility



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conclusion

In present MC2020,
the field of application is limited

- In present condition, it is difficult for application to real-time embedded systems
- Improvement point
  - management method of instance
  - new/delete method of event instance
  - Optimization of an implementation class