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Software Reuse and Components

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OO Technologies

Continuously developed by Programming Language people.

Concepts	FClass, Inheritance, Polymorphism, etc.
Languages	FSmalltalk, C++, Java™, etc.

Advantages

Developers
 Easy to develop apps by using software parts

Maintenance
 Easy to enhance and easy to transport apps

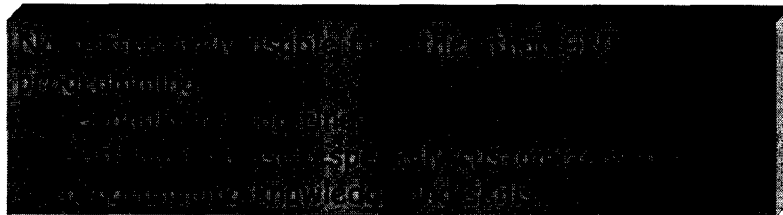
Users
 Simple and standardized operations of systems achieved by design and implementation with GUI common parts

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Reusable Objects to develop GUI

MVC Architecture
MacApp®
MFC



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Efforts to solve granularity mismatch

Efforts to solve the gap between granularity of the parts expected by app developers and achieved by classes

- Patterns
- Frameworks
- Components

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Patterns

A generalized combination of interacting classes commonly applicable to analysis and /or design of various problems. Patterns are catalogued in a document.

ExampleGoF "Design Patterns"
describing reusable 23 common
design patterns

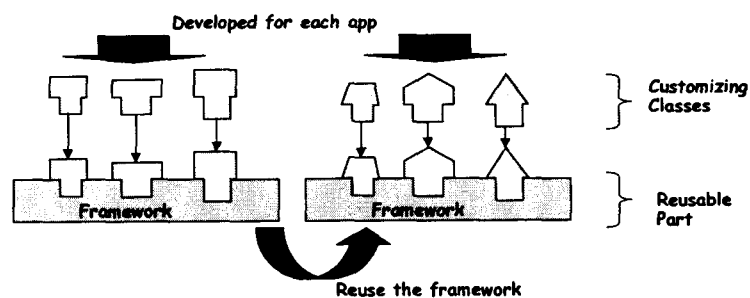
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Frameworks

The basic structure of the software architecture. Defined for an area or a type of apps in the form of class definition. The classes in the framework could be customized by "inheritance", or "subclass".



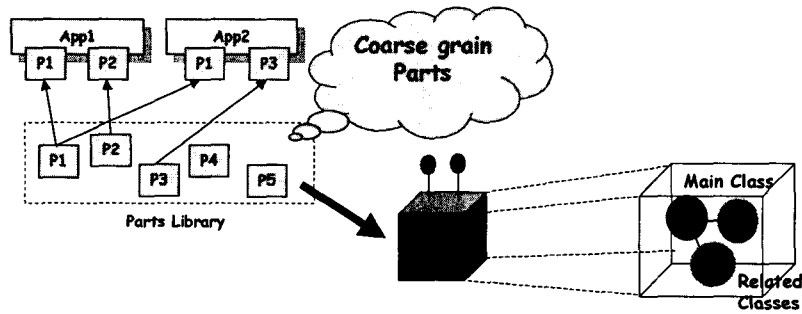
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Components

Reusable parts consisting of one main class and the related classes. Only the methods defined in the main class and the interfaces to customize the component are externally visible.



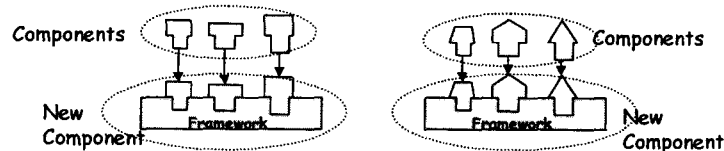
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Frameworks and Components

- ◆ Frameworks as runtime environments for Components
Frameworks provide APIs for processes common to Components, such as error processing, data exchange, the components invocation, and so on.
- ◆ Framework to glue components
Framework glue components to form a new component of more coarse grain. This feature could make it easier to develop components.




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EJB™ Case

- ◆ EJB Container as a framework
 - Runtime environment for EJBs(o)
 - Glue to combine EJBs(o)
 - But, the glued EJBs could not be an EJB(x)
- ◆ MVC model Framework
 - Runtime environment for EJBs(o)
 - Glue to combine EJBs(o)
 - But, the glued EJBs could not be an EJB(x)

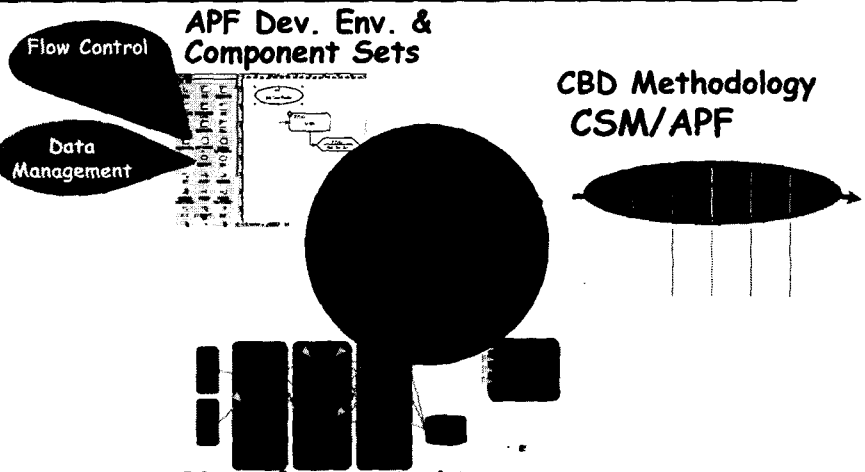
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APF Case : TOSHIBA's Approach



Flow Control

Data Management

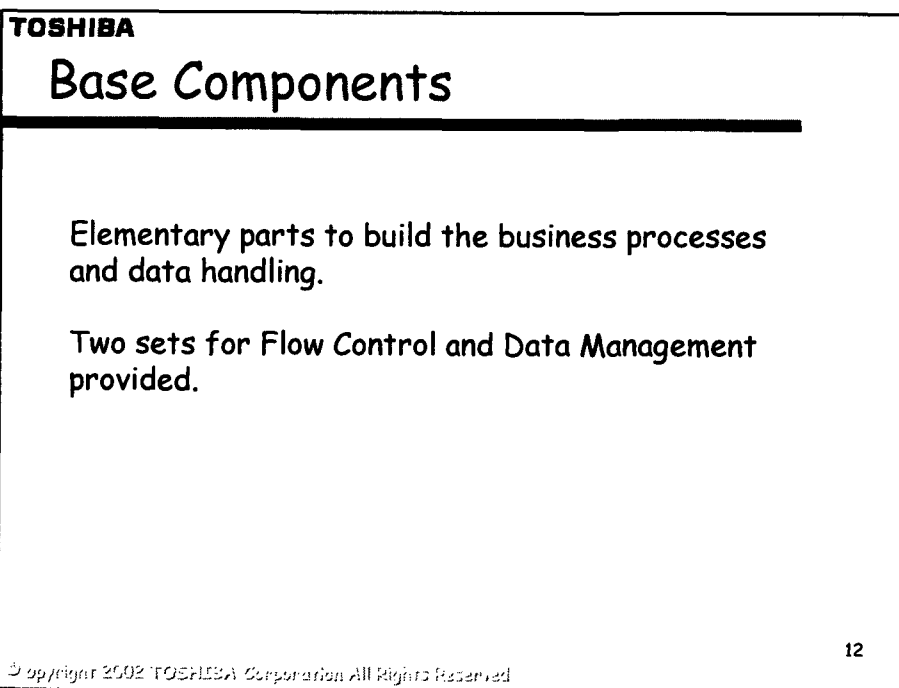
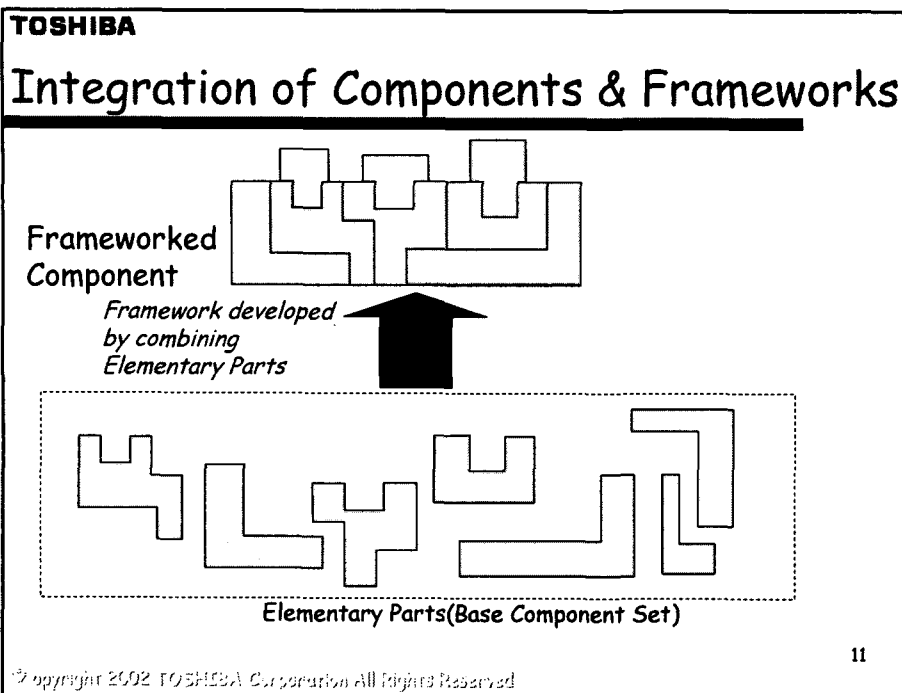
APF Dev. Env. & Component Sets

CBD Methodology
CSM/APF

CBD Software Architecture
PSER

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Base Component Sets

Flow Control	To control the execution flow in the app, invoke other components and synchronize the execution with GUI.
Data Management	To manage(Insert, Search, Update, and Delete) the data in Database, and perform the related processes.
RDB Wrapper	The interface enabling access to RDB in an OO manner.

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Flow Control Base Component Set

精選録 手順 定義済み手順 繰り返し手順 定義済み繰り返し手順 分岐

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死 注釈用印付

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Data Management Base Component Set

insert BC 追加BC update BC 更新BC store BC 保管BC delete BC 削除BC

select BC 複数検索BC find BC 単数検索BC Vector CC Vector反復CC Collection CC Collection反復CC

I CC Iterator反復CC En CC Enumeration反復CC H CC Hashtable反復CC Hk CC Hashtableキー反復CC

Hv CC Hashtable値反復CC Map CC Map反復CC Mapk CC Mapキー反復CC Mapv CC Map値反復CC

構造線

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Component Bubbles

APF provides 3 levels of granularity of components.

Coarse grain

Component Granularity ↑

Fine grain

APF "Models"
(Mapped to EJBaan)

APF "Compound Components"

APF Base Components

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