

Systems Development

Detailed Design

<http://lbgeeks.com/gitc/systemsDeta.php>

April 30, 2007

- **Design Sub Phases**
- **Detailed OO Documentation**
- **Table Design**
- **Human Factors**
- **Schedule Reminders**

Design Sub Phases

- **Preliminary design:**
 - Captures general organization
 - External representation of design elements
 - Transaction focus
- **Detailed design:**
 - Sufficient details for coding
 - Internal representation of design elements
 - Function focus
- **Splitting design into phases reduces errors:**
 - High level view spotlights interface errors
 - Verify on paper no missing elements

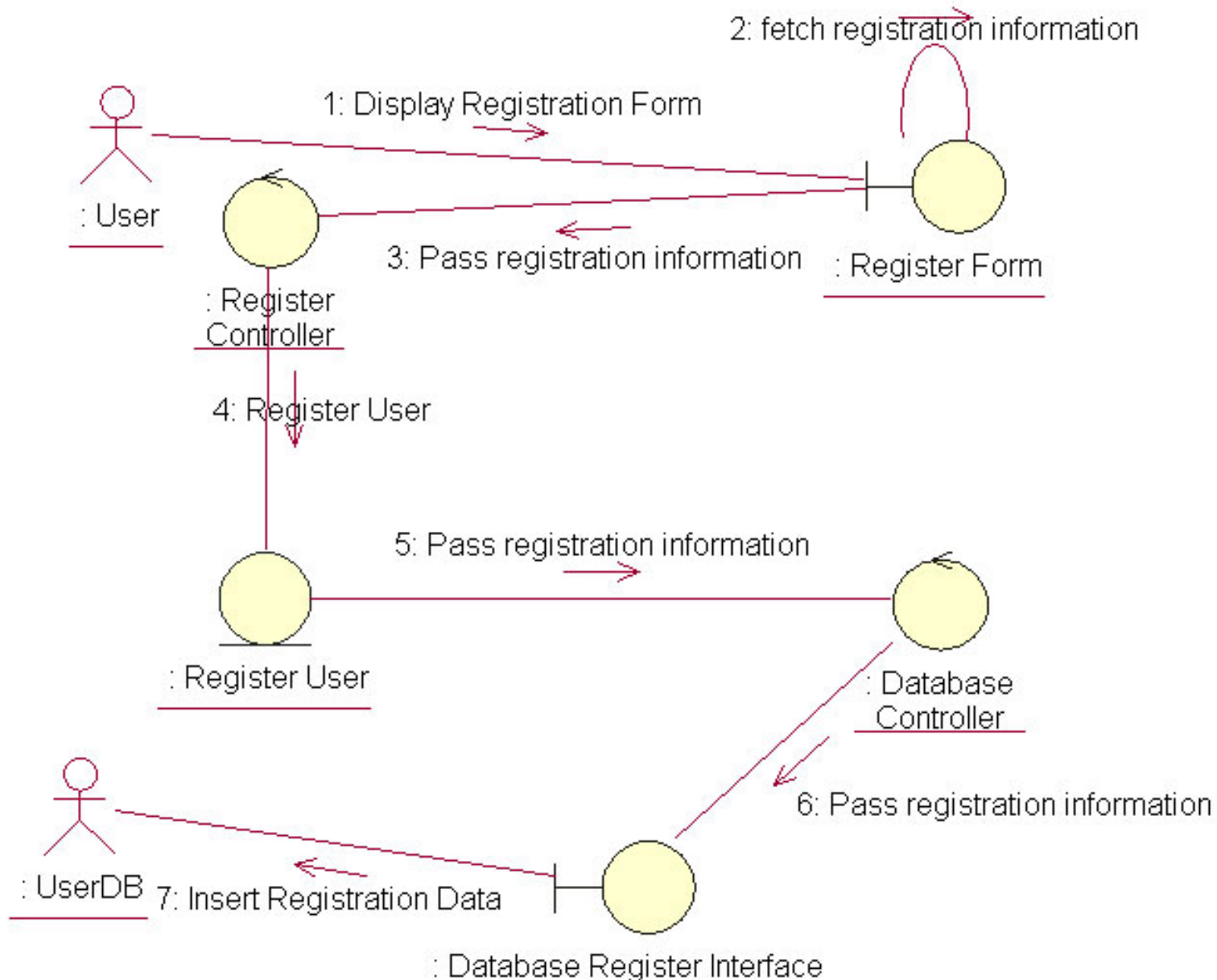
Detailed OO Documentation

- **Collaboration Diagrams**
 - Purpose (repeat)
 - Example (repeat)
 - Required Content
 - Notation
 - More Examples
- **Pseudo Code**
 - Discussion (repeat)
 - Required Content
 - Guidelines
 - Pseudo And Real Code Example

Collaboration Diagram Purpose

- **Next level of detail under object diagrams**
- **Incorporates sequence diagram information**
- **Shows order of method invocations among objects in performing a transaction**
- **Complete specification for executives (methods that call other methods)**

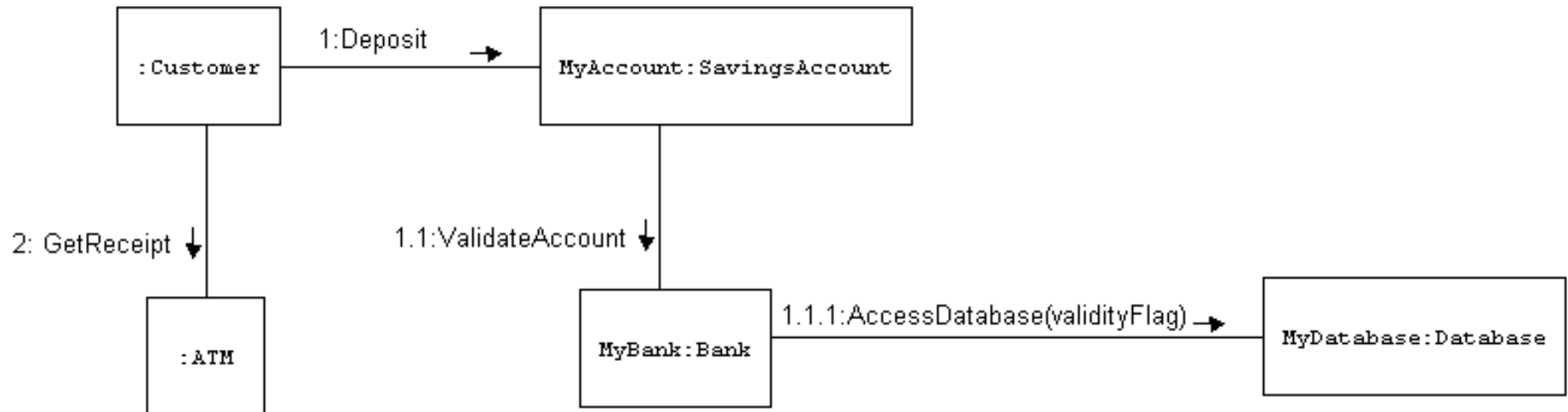
Collaboration Diagram Example



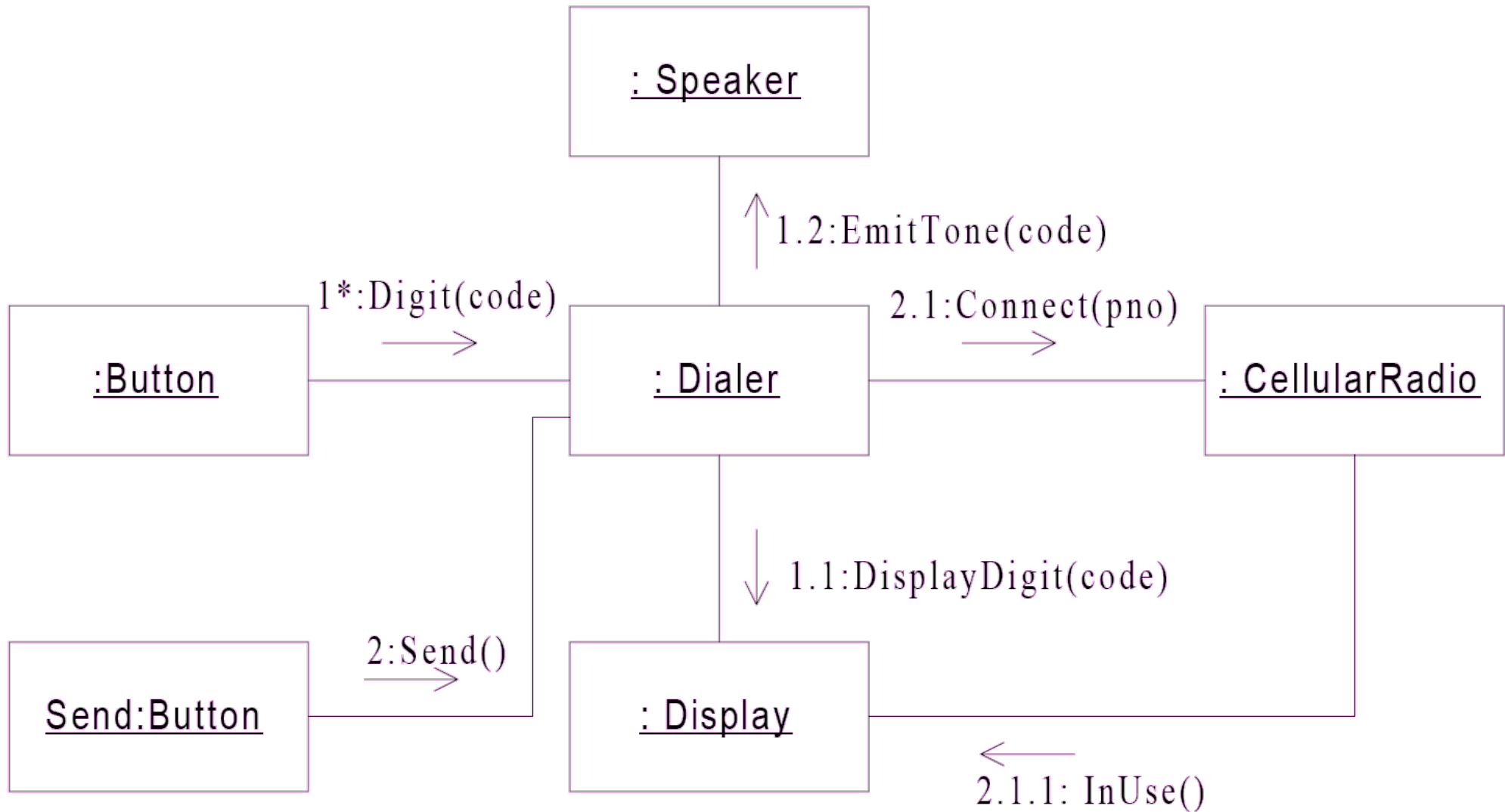
Collaboration Diagram Required Content

- **Classes:**
 - Name and quantity
 - Include object name if ambiguous
- **Messages:**
 - Names, order, direction
 - Parameters and return if ambiguous
- **External entities may be modelled as actors or classes**
- **Numbering:**
 - Sequential, e.g. 1, 2, 3...
 - Hierarchical, e.g. 1.1, 1.2, 1.3, 2.1, 2.2, ...

Collaboration Diagram Example



Collaboration Diagram Example



Pseudo Code Discussion

- **Final step before implementation**
- **Used to organize algorithms, expressions**
- **Natural language expression of code**
- **Free form syntax may be imprecise**
- **Several steps may be represented by a single sentence**
- **Enough detail that experienced coder can generate computer language statements**

Pseudo Code Required Content

- **Major internal storage variables**
- **Sequence of operations**
- **Flow control: decision (if), loops (while)**
- **Function and procedure calls**
- **Error handling**
- **Enough detail so a new programmer can write code**

Pseudo Code Guidelines

- **Use both computer and natural language**
 - Precise use of keywords, e.g. if-then-else
 - Sentence fragments allowed
- **Significant details**
 - Minor details taken care of during coding
 - Obvious items interrupt clarity
- **Focus on necessary work**
 - No need to say how a sort routine works
 - But what if writing a sorting routine?
- **Keep a balance between customers and software professionals**

Pseudo Code Example

```
if credit card number is valid
    execute transaction using number,
    order
else
    show generic failure message
end if
```

Pseudo Code To PHP

```
<?php
if (is_valid($cc_number)
    {
    execute_transaction($cc_number,
        $order);
    }
else
    {
    show_failure();
    }
?>
```

- **Relational Model**
- **Primary And Foreign Keys**
- **Normal Forms**
 - **First normal form, or 1NF**
 - **Second normal form, or 2NF**
 - **Third normal form, or 3NF**
- **Normalization example part of readings, study guide**

- **Terminology:**
 - **Data item**
 - **Column**
 - **Row**
 - **Table**
- **Theory:**
 - **Table is a set of sets**
 - **Columns represent elements, classes**
 - **Rows represent instances, objects, vectors**
- **Relational algebra used to manipulate results obtained from queries**

Primary And Foreign Keys

- **Primary key guarantees unique rows**
- **Foreign key matches row in another table**
- **Keys are indexed for faster retrieval**

First Normal Form (1NF)

- Every row in the table must be unique
- Every data item must have exactly one value

<u>Anun</u>	<u>Or</u>	<u>Dram</u>
Vartan	Yerkushapti	1.900, -2.820
Vartan	Chorekshapti	-8.400
Lucine	Urpat	10.000, 15.000, -4.000

Second Normal Form (2NF)

- Meets criteria for 1NF
- All non-key columns functionally depend on all key columns

<u>Anun</u>	<u>Hemtutyun</u>	<u>Hastse</u>
Vartan	Nekarich	114 Main Street
Vartan	Kinonekarich	114 Main Street
Vartan	Gerogh	114 Main Street
Lucine	Inzhener	73 Industrial Way
Shushanik	Tentesaget	73 Industrial Way
Shushanik	Usutsich	73 Industrial Way

Third Normal Form (3NF)

- Meet criteria for both 1NF and 2NF
- All non-key columns related to key
- No data stored that can be calculated from other columns

<u>Banali</u>	<u>Anun</u>	<u>Gin</u>	<u>Orer</u>	<u>Inchkan?</u>
1000	Vartan	3.500	3	10.500
1001	Lucine	2.500	2	5.000
1002	Shushanik	2.500	3	7.500

- **Definition and Purpose**
- **Basic Principles:**
 - **Use Controls Properly**
 - **Handle Errors Politely**
 - **Provide Help Generously**
 - **Layout Items Simply**

Definition and Purpose

- **Definition:**
 - Human factors is the psychology of how people interact with things
 - Why are some things easy to use, others not?
- **Purpose:**
 - Understand proper form, report, screen designs
 - Guidelines for people-centric software

Use Controls Properly

- **Every control has a unique purpose:**
 - **Command button**
 - **Radio button**
 - **Check box**
 - **Label**
 - **Text field**
- **Controls must be used appropriately**
- **Otherwise easy to understand form becomes cumbersome if expectations violated**

Handle Errors Politely

- **Objects responsible for their own state:**
 - **Accept incorrect data but do not crash**
 - **Do not commit operation until safe**
- **Supply default values where appropriate**
- **Inform user of missing data**
- **Check inputs for range validity**
- **Trap system errors when expected**
- **Offer possible solution to problem**
- **Shared problem of application and database**

Provide Help Generously

- **Offer assistance where possible:**
 - “Tool tips”
 - Status bar text
 - Help buttons
 - Hyperlink to manual
- **Two or three simple ways to offer guidance when control focus changes**
- **Training modes:**
 - Additional information in pop-up screens
 - Limit information to most necessary options

Layout Items Simply

- **Here is a terrible web site:**
 - http://www.ueditvideo.com/site2006/index_2.html
- **Compare this with our GITC course web site**
- **Which is easier to figure out?**
- **Design must account for accessibility:**
 - **Color blindness**
 - **Visual impairment**
- **Clean and simple may not win an award, but it does win fans!**

Class Schedule Reminders

- **Sessions at 19:00:**
 - **Wednesday, May 2**
 - **Monday, May 7**
 - **Wednesday, May 9**
- **Next Unit Starts May 14**
 - **Quiz at 16:45**
 - **Assignment due at start of class**