Test Driven Requirements

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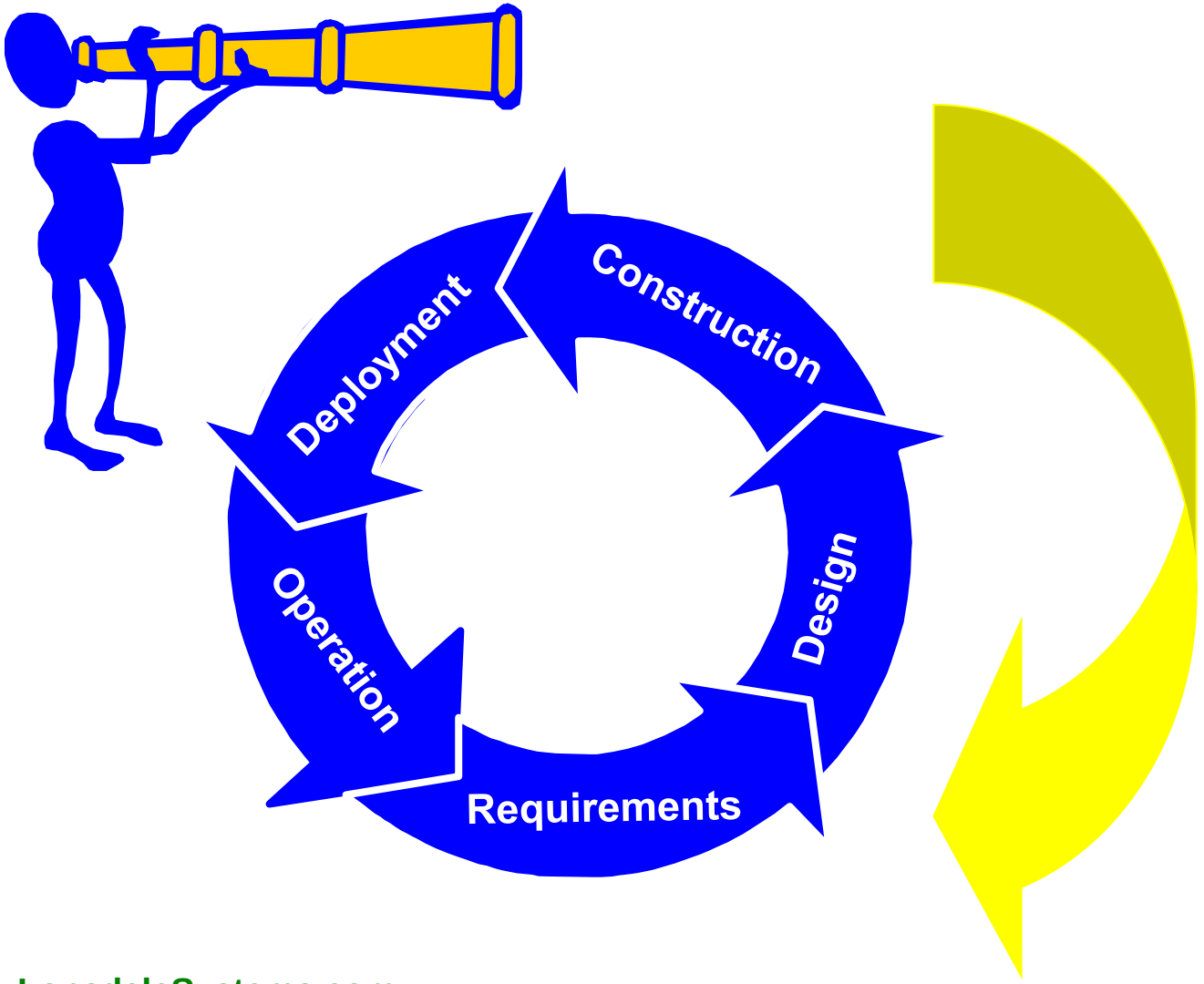
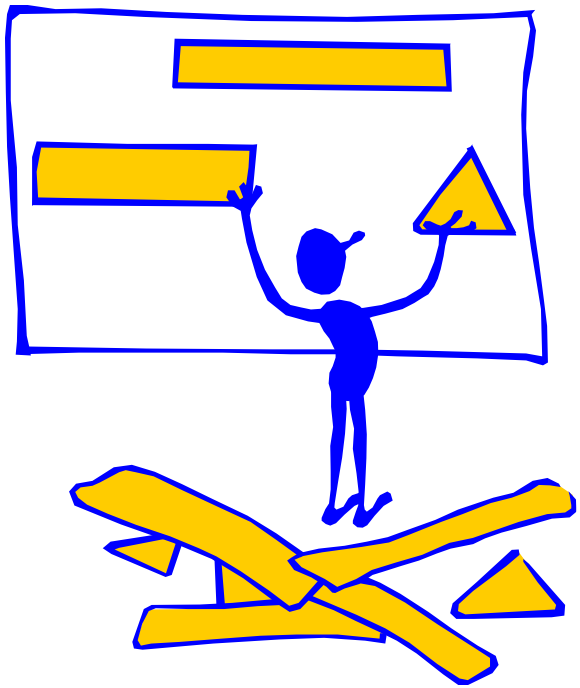
Software Development Trends

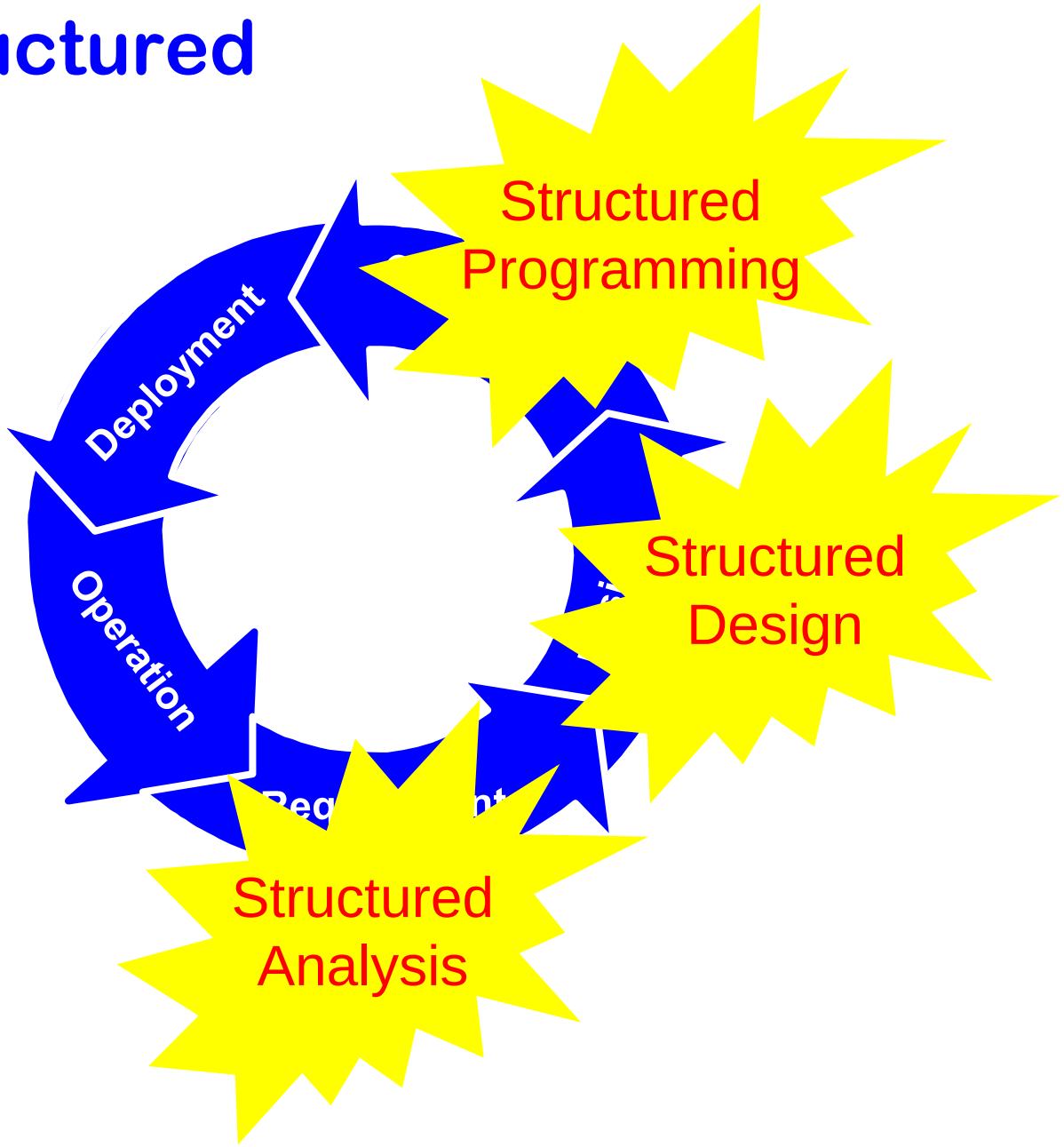
The Software Development Life Cycle



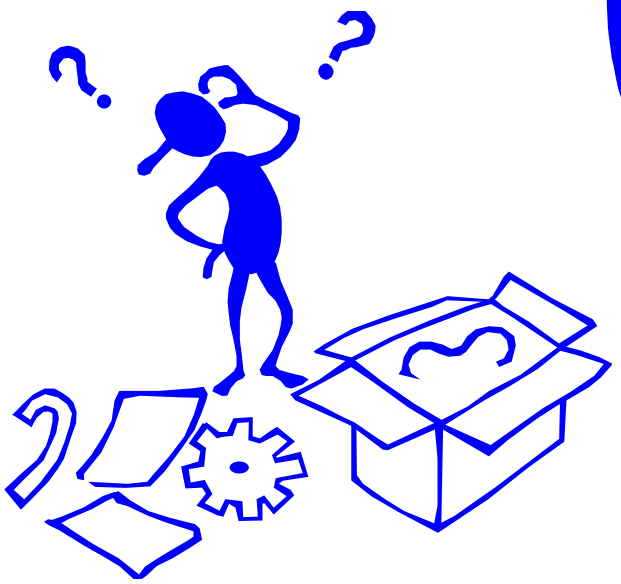
Trends propagate backwards through the development life cycle

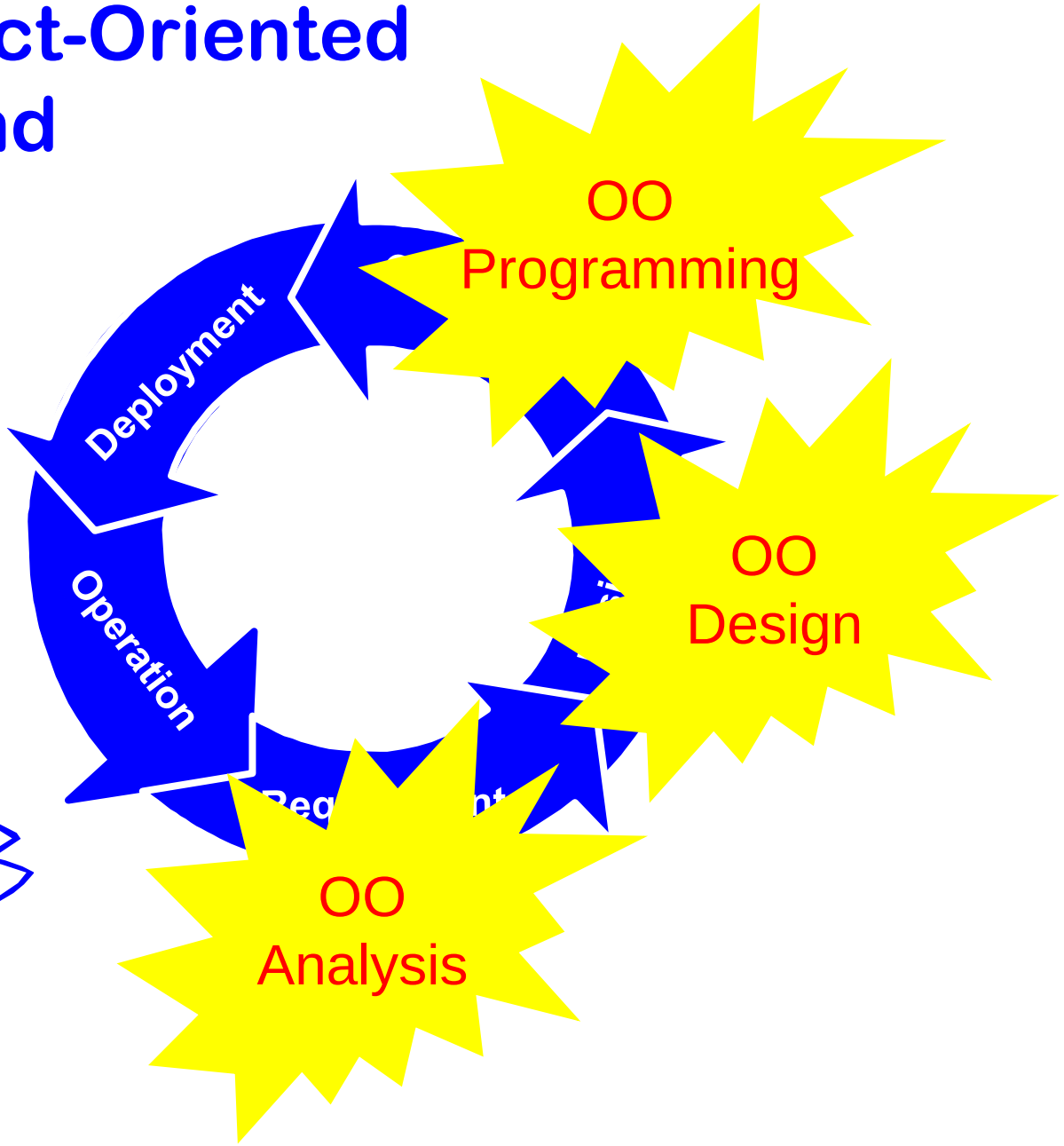
80's The Structured Trend



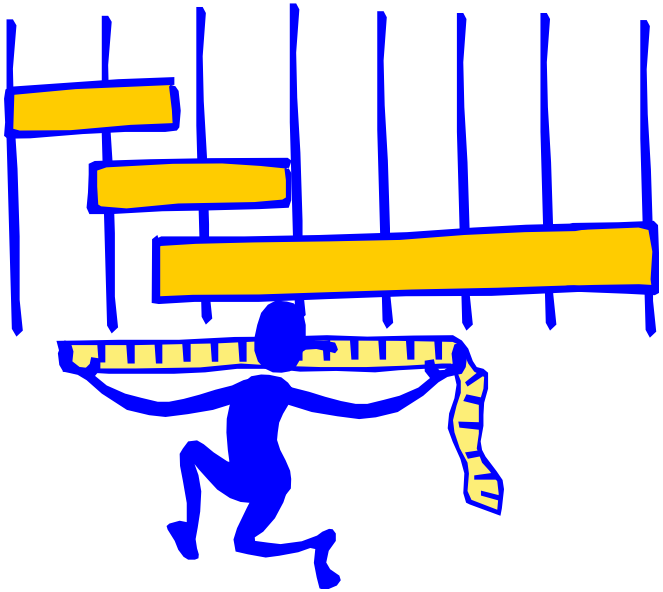


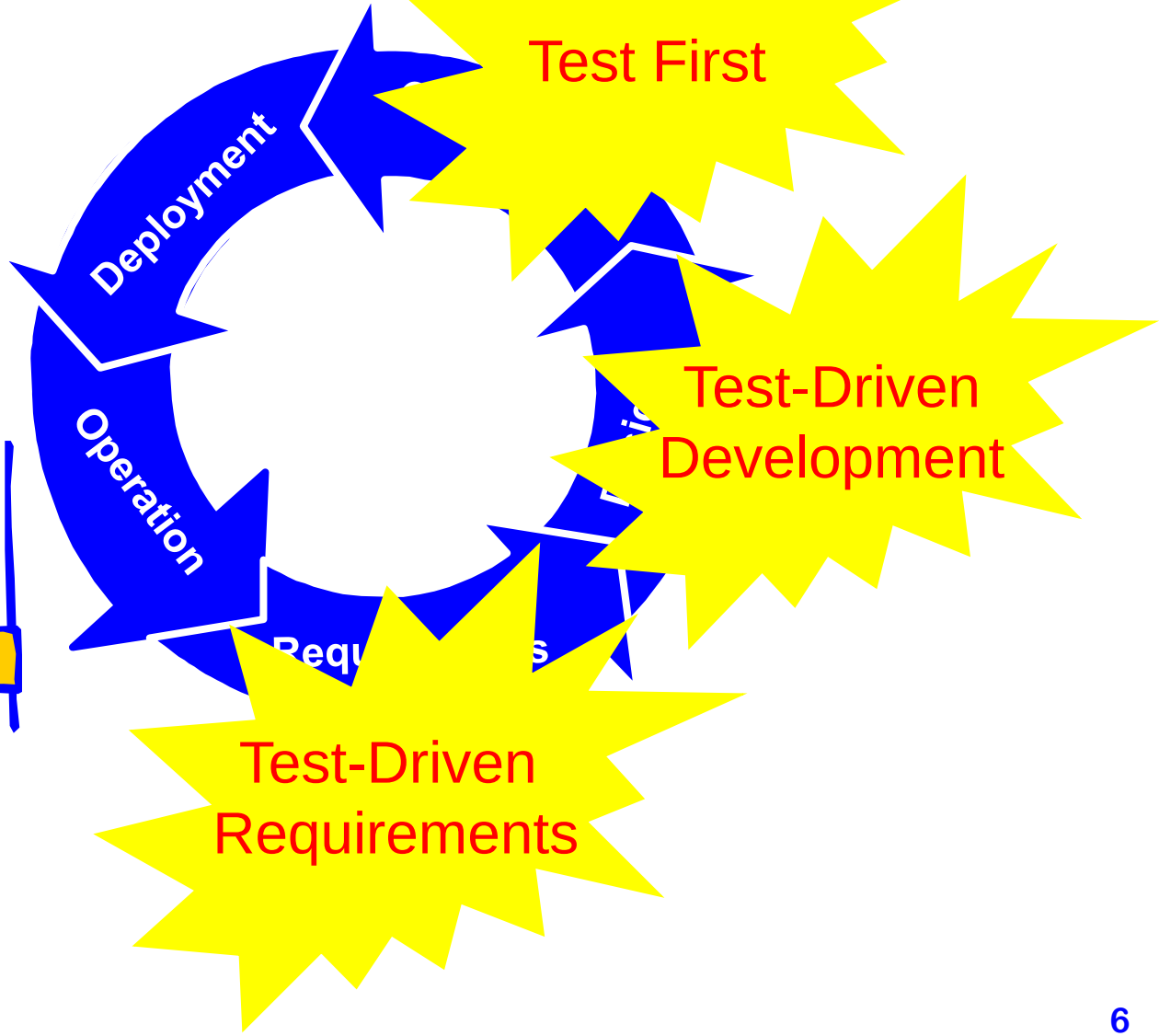
90's The Object-Oriented Trend





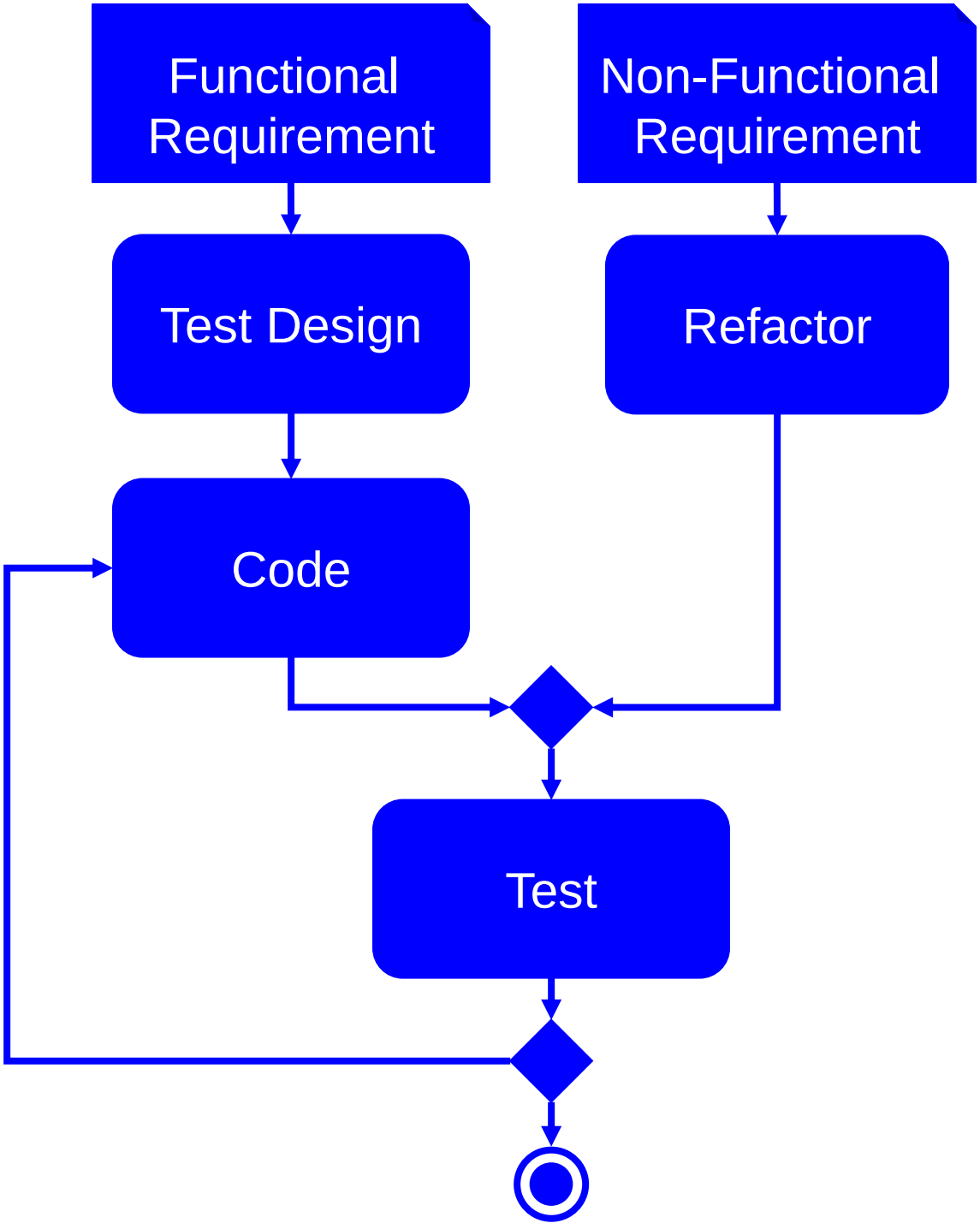
00's The Test-Driven Trend





Brief Overview of Test-Driven Development

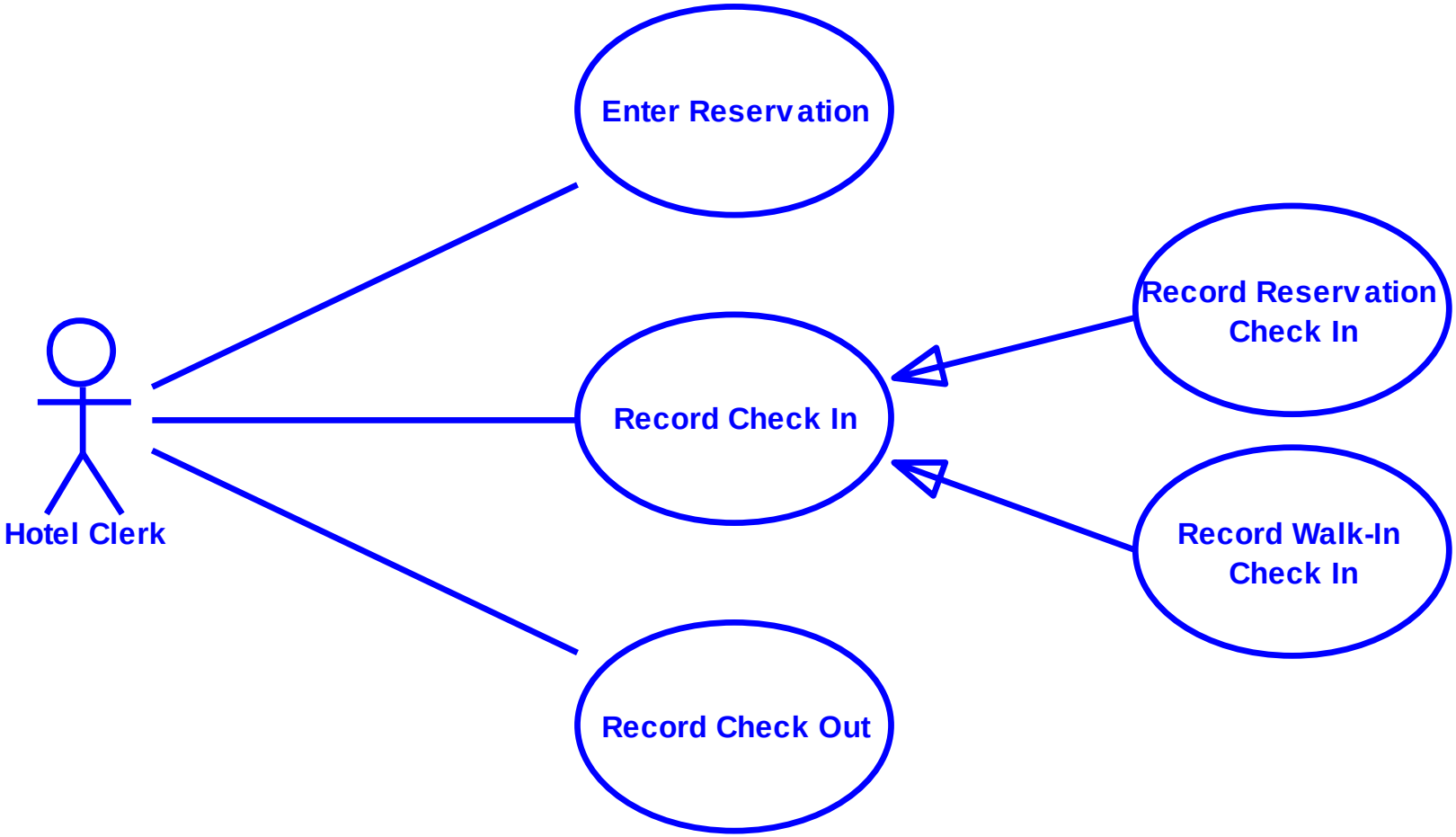
Test-Driven Development



Requirements

Use Case Model

Hotel



Use Case

Record Check Out

Main Scenario

1. The hotel staff enter the guest's room number
2. The system displays the guest's stay details
3. The system calculates the room charge

Alternate Scenarios

a) Late check out and no prior arrangement at step 3

a1. The guest is charged for an extra night

b) Check out the same day as check in at step

b1. The guest is charged for one night

Business Rules

number of nights = today's date - check in dat

room charge = number of nights x room rate

Normal check out time is 12pm

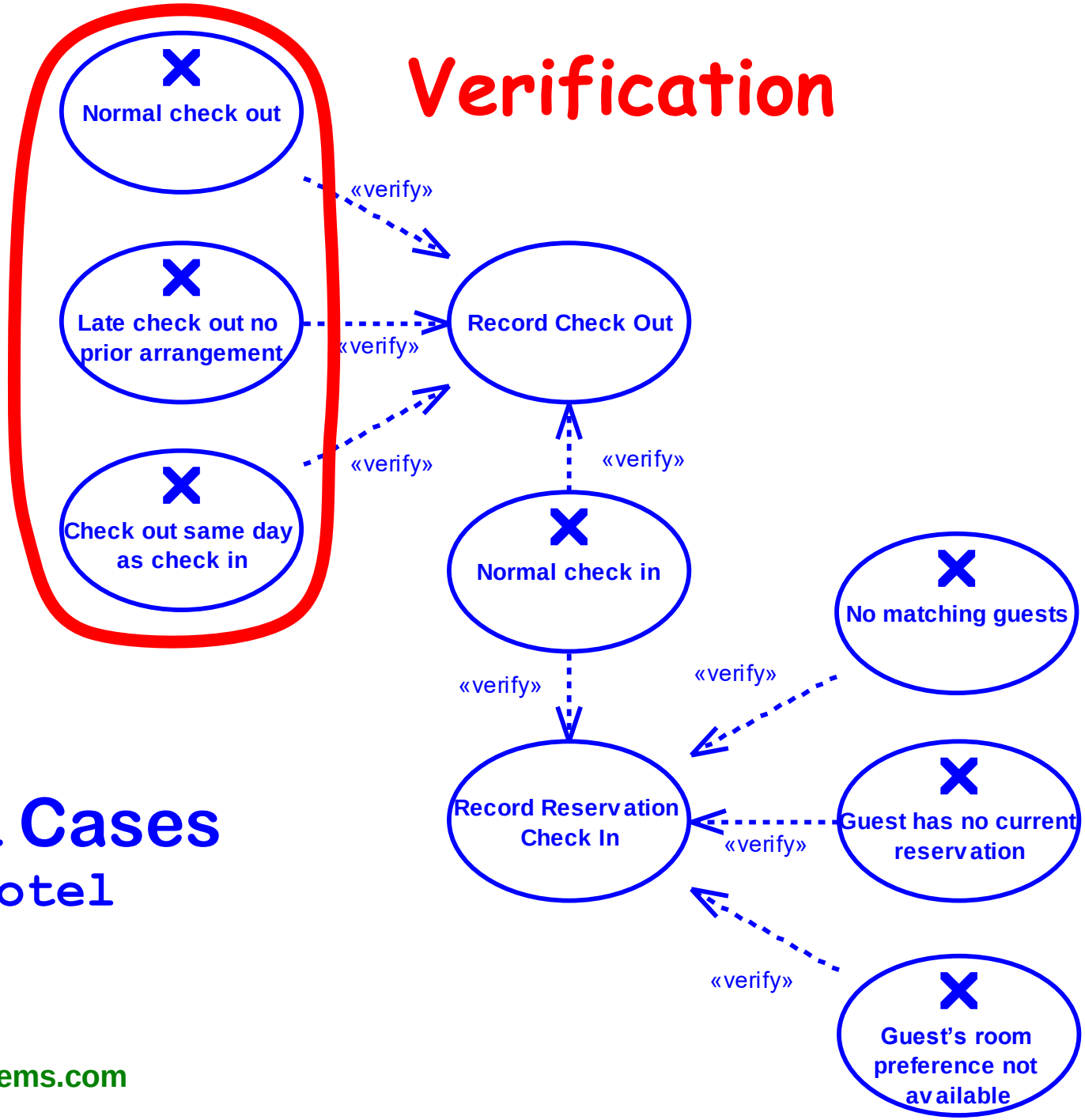
Guests may request a later check out time

Late check outs must be before 6pm

Validation

Testing Requirements

Verification



Test Cases

Hotel

Today = 17/8/2006

Requirements Verification

Record Check Out

Check in date	Checkout time	Late checkout time	Room rate	Charge	Comment
12/8/2006	11:30 am	None	$120	$600	Normal check out
12/8/2006	5:30 pm	None	$120	$720	Late check out no prior arrangement
17/8/2006	11:30 pm	None	$120	$120	Check out same day as check in

In-Depth Testing

- Maximum length of stay?
- Maximum and minimum room rates?
- Check out same day as check in
  - With late check out no prior arrangement?
  - Check in after 12am?

Test Case Design Techniques

Test Case Design Techniques

Black-box

- Equivalence partitioning
- Boundary value analysis
- Syntax testing
- Decision table testing
- State transition testing

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Glass-box

- Statement testing
- Branch/decision testing
- Condition testing
- Linear code sequence and jump (LCSAJ) testing
- Basis path testing
- Data flow testing

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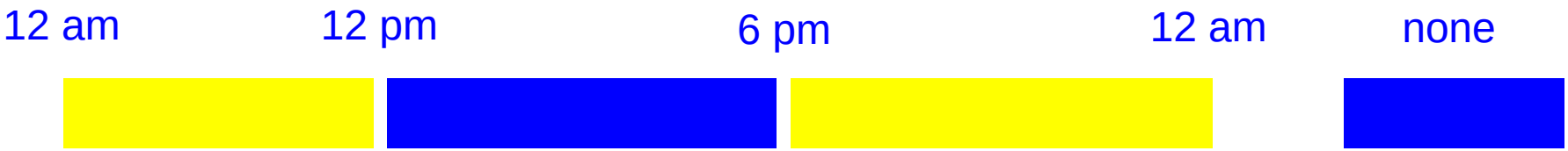
Equivalence Partitioning

Hotel Check Out

Check in date

Charge

Late check out time



Today = 17/8/2006

Equivalence Partitioning

Hotel Check Out

Test Case	Partitions	Check in date	Checkout time	Late checkout time	Room rate	Charge	Comment
1	1,4,10,13, 18	8/7/2006	11:30 am	None	120	4800	Invalid check in date
2	2,4,10,13, 17	12/8/2006	11:30 am	None	120	600	
3	3,4,10,13, 15	27/8/2006	11:30 am	None	120	-1200	Invalid check in date
4	2,5,10,13, 17	12/8/2006	5:30 pm	None	120	720	
5	2,5,8,13, 17	12/8/2006	2:30 pm	3:00 pm	120	600	
6	2,6,8,13, 17	12/8/2006	4:30 pm	3:00 pm	120	720	

Equivalence Partitioning

Hotel Check Out

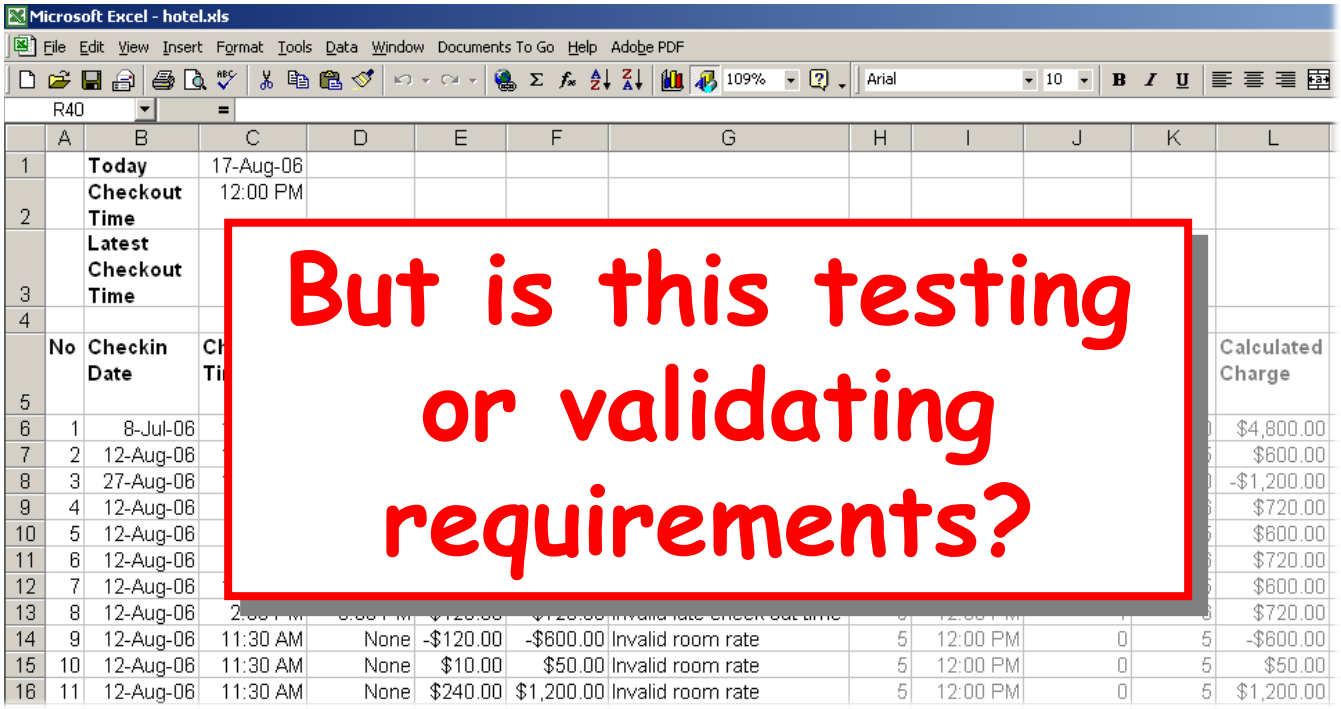
Today = 17/8/2006

Who "tests the test cases"?

Test Case	Partitions	Check in date	Checkout time	Late checkout time	Room rate	Charge	Comment
7	2,4,7,13, 17	12/8/2006	11:30 am	10:00 am	120	600	Invalid late check out time
8	2,5,9,13, 17	12/8/2006	2:30 pm	8:00 pm	120	720	Invalid late check out time
9	2,4,10,11, 15	12/8/2006	11:30 am	None	-120	-600	Invalid room rate
10	2,4,10,12, 16	12/8/2006	11:30 am	None	10	50	Invalid room rate
11	2,4,10,14, 18	12/8/2006	11:30 am	None	240	1200	Invalid room rate

Test Oracle

- Confirms agreement of test outcomes
  - Expected
  - Actual
- Human test oracle
  - Stakeholders
  - Users
  - Business analyst
- Automated test oracle
  - Spreadsheets
  - Automated test frameworks and tools

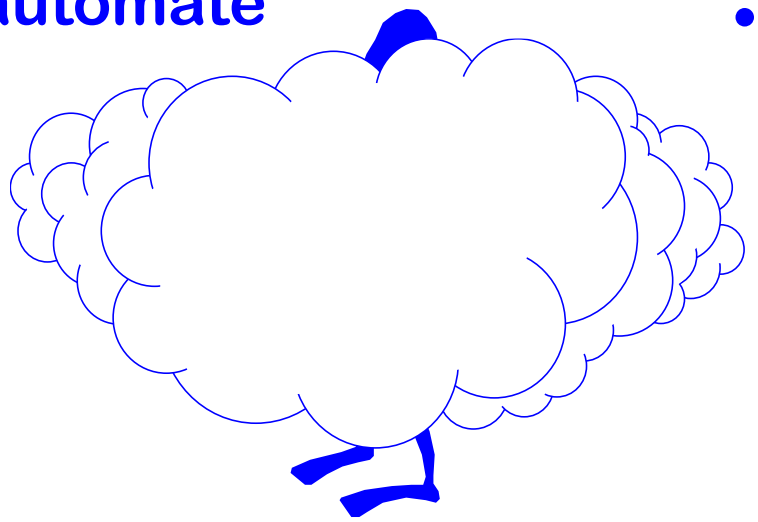


Test-Driven Requirements

Requirements vs. Test Cases

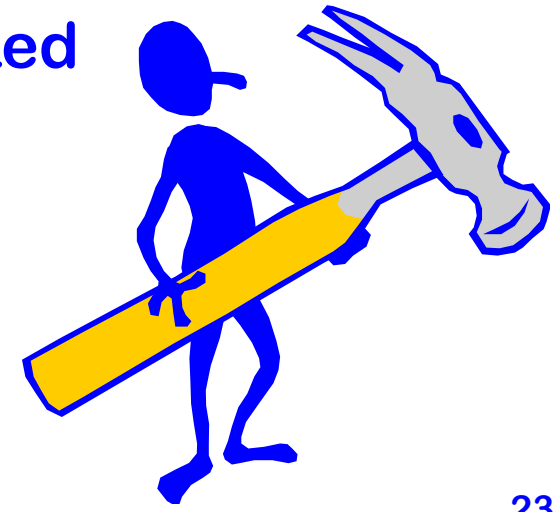
Requirement

- Abstract
- "What should be"
- Validated by stakeholders
- Validation difficult to automate

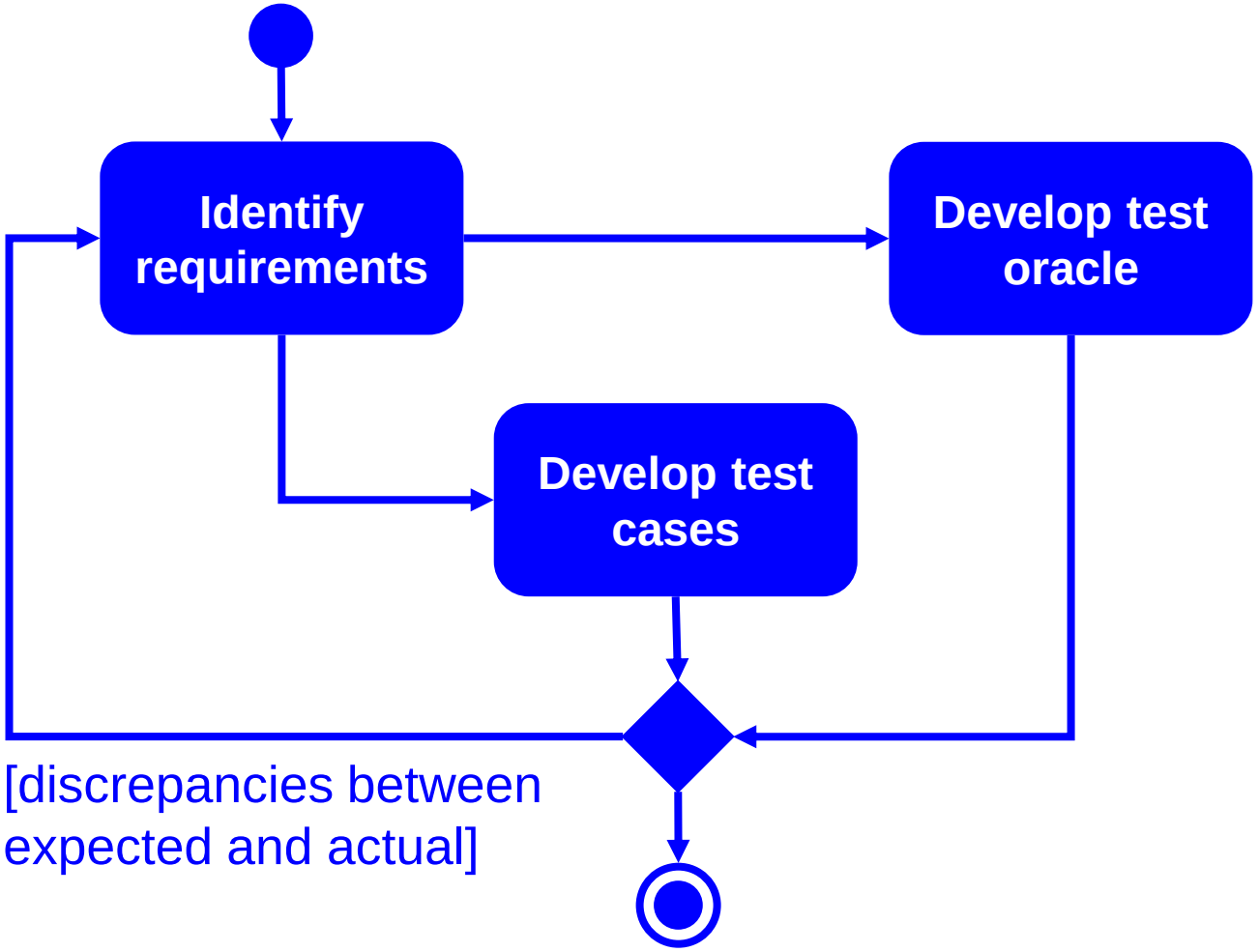


Test Case

- Concrete
- "What should be
- "What should not be"
- Validated by test oracle
- Test oracle can be automated



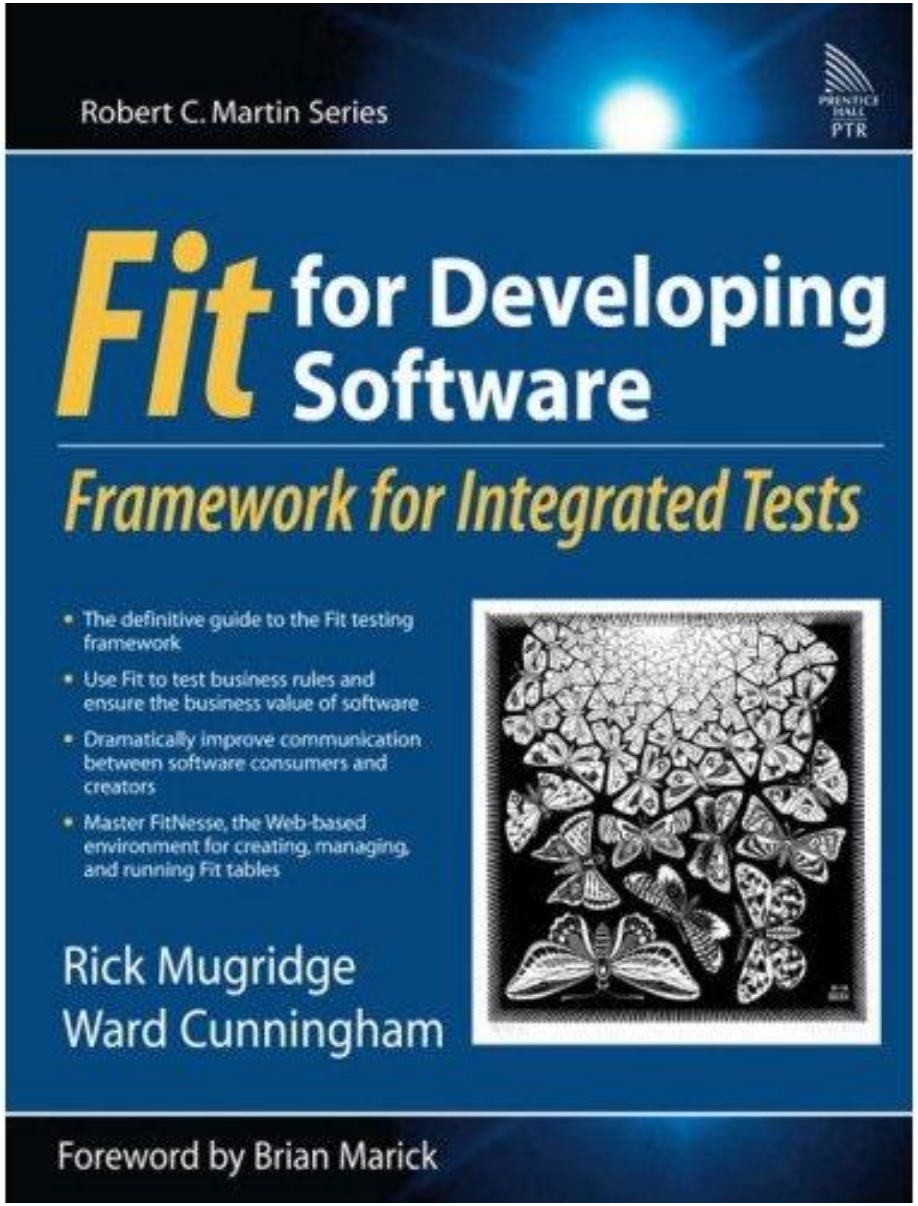
Test-Driven Requirements



FIT
Automated Test Framework

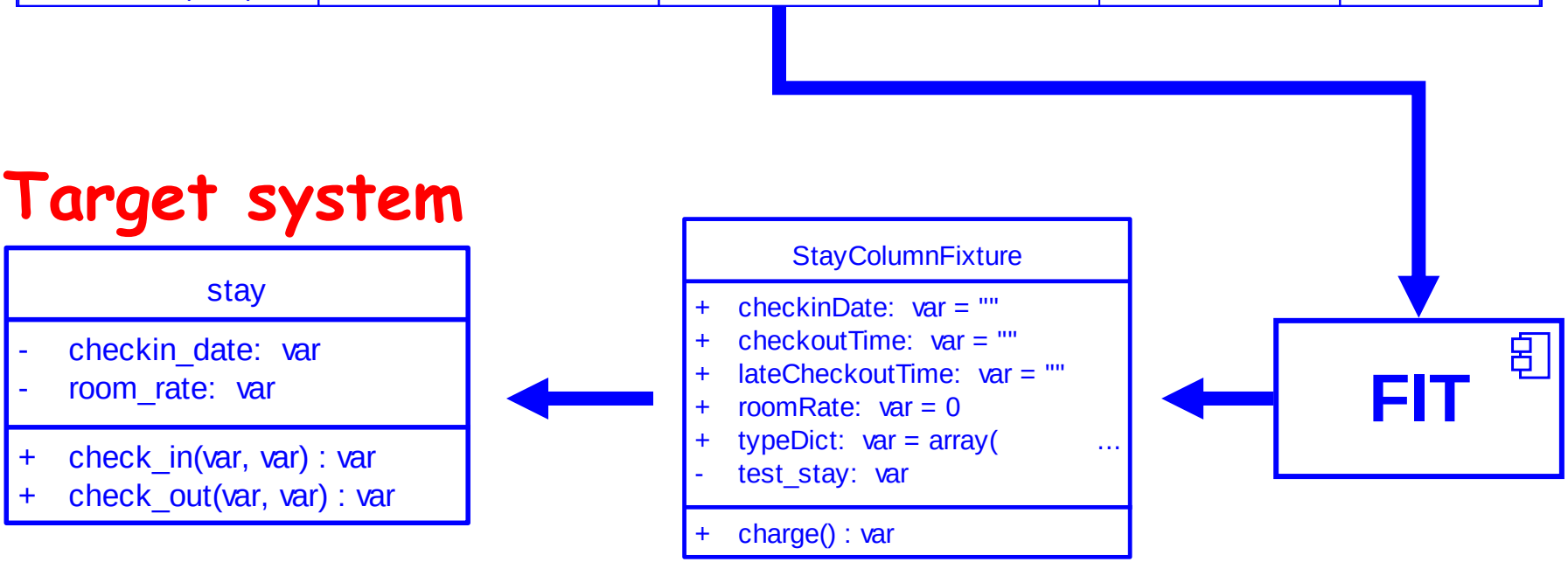
Framework For Integrated Tests (FIT)

- fit.c2.com/
- fitnesse.org/

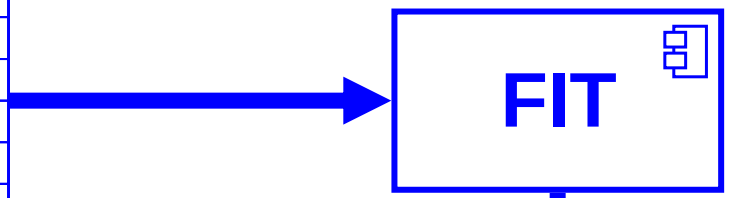


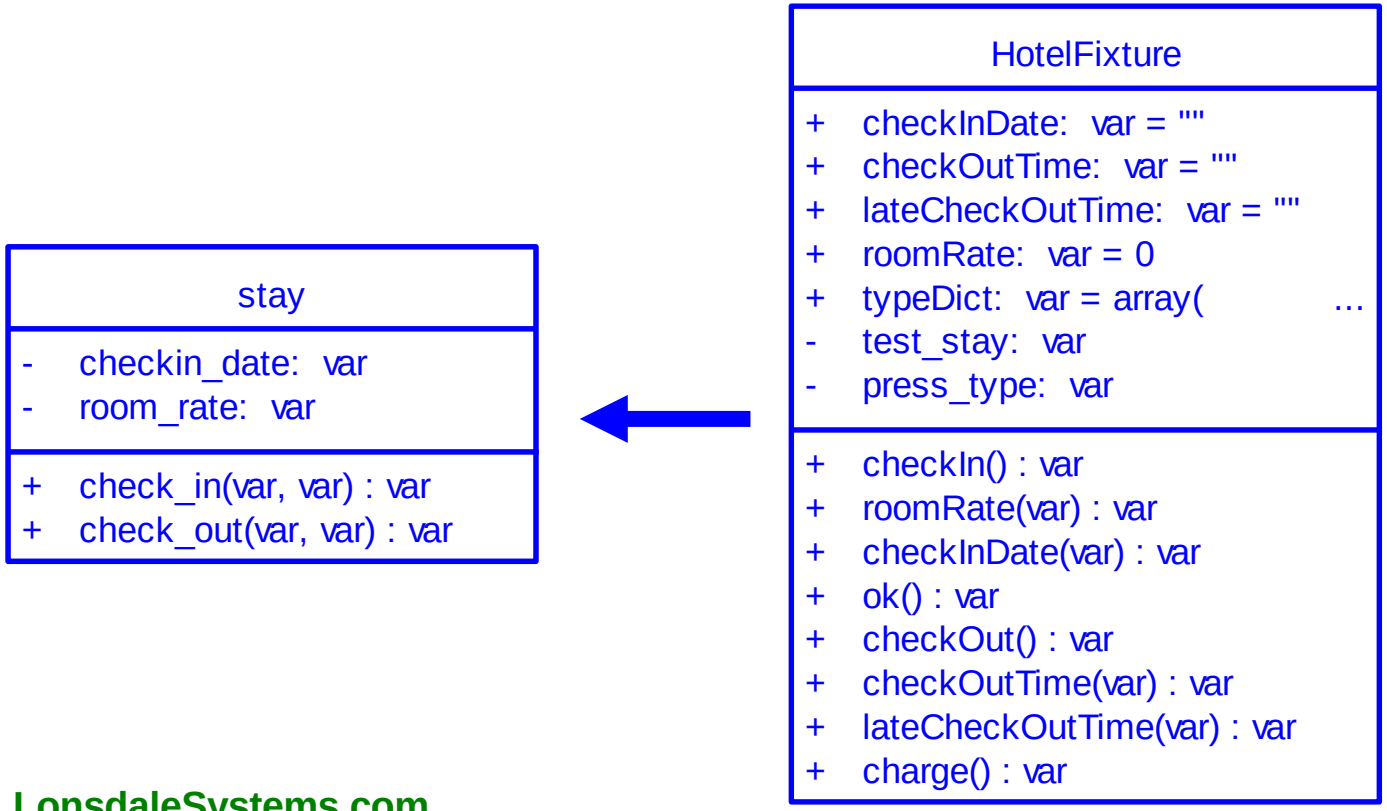
HTML table

checkinDate	checkoutTime	lateCheckoutTime	roomRate	charge()
1/07/06	11:30 AM	None	85	error
18/07/06	11:30 AM	None	250	error
12/08/06	11:30 AM	None	85	425
12/08/06	12:30 PM	None	85	510
12/08/06	11:45 PM	11:30 AM	85	error
12/08/06	2:15 PM	2:30 PM	85	425
12/08/06	2:15 PM	7:30 PM	85	error
12/08/06	7:30 PM	2:30 PM	85	510
12/08/06	11:30 AM	None	-85	error
16/08/06	11:30 AM	None	10	error
22/08/06	11:30 AM	None	85	error



start	eg.HotelFixture	
press	check in	
enter	room rate	85
enter	check in date	12/08/06
press	ok	
press	check out	
enter	check out time	11:30 AM
enter	late check out time	None
check	charge	426
press	ok	





start	eg.MScalc	
press	clear	
enter	number	2.99999999999999999999
press	add	
enter	number	3.00000000000000000000001
press	equals	
check	result	6
press	subtract	
enter	number	2
press	equals	
check	result	4
press	clear	
enter	number	4
press	multiply	
enter	number	2
press	equals