Applying UML and Patterns

An Introduction to Object-oriented Analysis and Design and Iterative Development

Part II Inception

Chapters

4. Inception is not the requirement phase
5. Evolutionary requirement
6. Use cases
7. ***Other requirements***

Chap 7
Other Requirements

Other Requirement Artifacts

- Supplementary Specification
  - captures and identifies other kinds of requirements, such as reports, documentation, packaging, supportability, licensing, ..
- Glossary
  - captures terms and definitions; it can also play the role of a data dictionary.
- Vision
  - summarizes the "vision" of the project an executive summary. It serves to tersely communicate the big ideas.
- Business Rules (or Domain Rules)
  - capture long-living and spanning rules or policies, such as tax laws, that transcend one particular application.

Guideline:
Don't Analyze All Requirements During Inception

- UP is an iterative and evolutionary method
  - Production-quality programming and testing should happen very early, long before most requirements have been fully analyzed or recorded.
  - Feedback from early programming and tests evolve the requirements.

Supplementary Specification 1

- Supplementary Specification
  - captures other requirements, information, and constraints not easily captured in the use cases or Glossary
  - including system-wide "URPS+" (usability, reliability, performance, supportability, and more) quality attributes or non-functional requirements.
- non-functional requirements specific to a use case can be first briefly written within in the Special Requirements section

Supplementary Specification 2

- Elements of the Supplementary Specification
  - FURPS+
    - Some functions or features don't fit in a use case format. we did think of the functionality in terms of features, such as "add EJB Entity Bean 1.0 support."
  - reports
  - Hardware/software constraints (operating and networking systems, …)
  - development constraints (for example, process or development tools)
  - other design and implementation constraints
  - internationalization concerns (units, languages)

Supplementary Specification 3

- Elements of the Supplementary Specification
  - documentation (user, installation, administration) and help
  - licensing and other legal concerns
  - packaging
  - packaging
  - standards (technical, safety, quality)
  - physical environment concerns (for example, heat or vibration)
  - operational concerns (for example, how do errors get handled, or how often should backups be done?)
  - application-specific domain rules
  - information in domains of interest (for example, what is the entire cycle of credit payment handling?)

POS Supplementary Specification 1

- Revision History

Version	Date	Description	Author
Inception draft	**Jan 10, 2031**	**First draft. To be refined primarily during elaboration.**	**Craig Larman**

- Introduction: This document is the repository of all NextGen POS requirements not captured in the use cases.
- Functionality (Functionality common across many use cases)
- Logging and Error Handling
  - Log all errors to persistent storage.

POS Supplementary Specification 2

- Pluggable Rules: At various scenario points of several use cases (to be defined) support the ability to customize the functionality of the system with a set of arbitrary rules that execute at that point or event.
- Security: All usage requires user authentication.
- Usability
- Human Factors: The customer will be able to see a large-monitor display of the POS. Therefore:
  - Text should be easily visible from 1 meter.
  - Avoid colors associated with common forms of color blindness.
  - Speed, ease, and error-free processing are paramount in sales processing, as the buyer wishes to leave quickly, or they perceive the purchasing experience (and seller) as less positive.
  - The cashier is often looking at the customer or items, not the computer display. Therefore, signals and warnings should be conveyed with sound rather than only via graphics.

POS Supplementary Specification 3

- Reliability
- Recoverability: If there is failure to use external services (payment authorizer, accounting system, ...) try to solve with a local solution (e.g., store and forward) in order to still complete a sale. Much more analysis is needed here...
- Performance: As mentioned under human factors, buyers want to complete sales processing very quickly. One bottleneck is external payment authorization. Our goal: authorization in less than1 minute, 90% of the time.
- Supportability
- Adaptability:Different customers of the NextGen POS have unique business rule and processing needs while processing a sale. Therefore, at several defined points in the scenario (for example, when a new sale is initiated, when a new line item is added) pluggable business rule will be enabled.

POS Supplementary Specification 4

- Configurability

  Different customers desire varying network configurations for their POS systems, such as thick versus thin clients, two-tier versus N-tier physical layers, and so forth. In addition, they desire the ability to modify these configurations, to reflect their changing business and performance needs. Therefore, the system will be somewhat configurable to reflect these needs. Much more analysis is needed in this area to discover the areas and degree of flexibility, and the effort to achieve it.

- Implementation Constraints

  NextGen leadership insists on a Java technologies solution, predicting this will improve long-term porting and supportability, in addition to ease of development.

- Purchased Components

  Tax calculator. Must support pluggable calculators for different countries.

POS Supplementary Specification 5

- Free Open Source Components
  - In general, we recommend maximizing the use of free Java technology open source components on this project.
  - Although it is premature to definitively design and choose components, we suggest the following as likely candidates:
    - JLog logging framework
    - …
- Interfaces
- Noteworthy Hardware and Interfaces
  - Touch screen monitor (this is perceived by operating systems as a regular monitor, and the touch gestures as mouse events)
  - Barcode laser scanner (these normally attach to a special keyboard, and the scanned input is perceived in software as keystrokes)
  - Receipt printer
  - Credit/debit card reader
  - Signature reader (but not in release 1)

POS Supplementary Specification 6

- Software Interfaces

  For most external collaborating systems (tax calculator, accounting, inventory, ...) we need to be able to plug in varying systems and thus varying interfaces.

- Application-Specific Domain (Business) Rules

  (See the separate Business Rules document for general rules.)

ID	Rule	Changeability	Source
RULE1	Purchaser discount rules. Examples: Employee20% off. Preferred Customer10% off. Senior15% off.	High. Each retailer uses different rules.	Retailer policy.

POS Supplementary Specification 7

ID	Rule	Changeability	Source
RULE2	Sale (transaction-level) discount rules. Applies to pre-tax total. Examples: 10% off if total greater than $100 USD. 5% off each Monday. 10% off all sales from 10am to 3pm today. Tofu 50% off from 9am-10am today.	High. Each retailer uses different rules, and they may change daily or hourly.	Retailer policy.

POS Supplementary Specification 8

ID	Rule	Changeability	Source
RULE 3	Product (line item level) discount rules. Examples: 10% off tractors this week. Buy 2 veggieburgers, get 1 free.	High. Each retailer uses different rules, and they may change daily or hourly.	Retailer policy.

POS Supplementary Specification 9

- Legal Issues
  - We recommend some open source components if their licensing restrictions can be resolved to allow resale of products that include open source software.
  - All tax rules must, by law, be applied during sales. Note that these can change frequently.
- Information in Domains of Interest
- Pricing
  - In addition to the pricing rules described in the domain rules section, note that products have an original price, and optionally a permanent markdown price. A product's price (before further discounts) is the permanent markdown price, if present. Organizations maintain the original price even if there is a permanent markdown price, for accounting and tax reasons.

POS Supplementary Specification 10

- Credit and Debit Payment Handling
  - When an electronic credit or debit payment is approved by a payment authorization service, they are responsible for paying the seller, not the buyer. Consequently, for each payment, the seller needs to record monies owing in their accounts receivable, from the authorization service. Usually on a nightly basis, the authorization service will perform an electronic funds transfer to the seller's account for the daily total owing, less a (small) per transaction fee that the service charges.
- Legal Issues
  - We recommend some open source components if their licensing restrictions can be resolved to allow resale of products that include open source software.
  - All tax rules must, by law, be applied during sales. Note that these can change frequently.

POS Supplementary Specification 11

- Information in Domains of Interest
- Pricing

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POS Supplementary Specification 12

- Sales Tax

  Sales tax calculations can be very complex, and regularly change in response to legislation at all levels of government. Therefore, delegating tax calculations to third-party calculator software (of which there are several available) is advisable. Tax may be owing to city, region, state, and national bodies. Some items may be tax exempt without qualification, or exempt depending on the buyer or target recipient (for example, a farmer or a child).

- Item Identifiers: UPCs, EANs, SKUs, Bar Codes, and Bar Code Readers

  The NextGen POS needs to support various item identifier schemes. UPCs (Universal Product Codes), EANs (European Article Numbering) and SKUs (Stock Keeping Units) are three common identifier systems for products that are sold. Japanese Article Numbers (JANs) are a kind of EAN version.

Vision 1

- The Key High-Level Goals and Problems of the Stakeholders

  This section summarizes the goals and problems at a high level often higher than specific use cases and reveals important non-functional and quality goals that may belong to one use case or span many, such as

  - We need fault-tolerant sales processing.
  - We need the ability to customize the business rules

  Guideline: Some Facilitation Methods

  - mind mapping, product vision box creation, fishbone diagrams, pareto diagrams, brainstorming, multi-voting, dot voting, nominal group process, brainwriting, and affinity grouping.

Vision 2

- Summary of System Features
  - system features are high-level, terse statements summarizing system functions.
  - In the UP, a system feature is "an externally observable service provided by the system which directly fulfills a stakeholder need“.
  - Features are behavioral functions a system can do. They should pass this linguistic test:
    - The system does <feature X>.
    - E.g. The system does payment authorization.
  - **Guideline**
    - A Vision with less than 10 features is desirable more can't be quickly grasped. If more, consider grouping and abstracting the features.

Vision 3

- Summary of System Features
  - **Guideline**
    - For other requirements, avoid their duplication or near-duplication in both the Vision and Supplementary Specification (SS). Rather, record them only in the SS. In the Vision, direct the reader to the SS for the other requirements.
  - Guideline: Should You Write the Vision or Use Cases First? A suggested sequence is:
    - Write a brief first draft of the Vision.
    - Identify user goals and the supporting use cases by name.
    - Write some use cases in detail, and start the Supplementary Specification.
    - Refine the Vision, summarizing information from these.
- A Case Study: POS

Glossary 1

- Guideline: Start the Glossary early. It will become a repository of detailed information.
- Glossary, a document that records data/metadata. During inception the glossary should be a simple document of terms and descriptions. During elaboration, it may expand into a data dictionary.
  - Term attributes could include:
  - aliases
  - description
  - format (type, length, unit)
  - relationships to other elements
  - range of values
  - validation rules

Glossary 2

- **Guideline: use the Glossary to Record Composite Terms**
  - It can include composite elements such as "sale" (which includes date and location) and nicknames used to describe a collection of data transmitted between actors in the use cases.
  - E.g. in the Process Sale use case,
    - System sends payment authorization request to an external Payment Authorization Service, and requests payment approval.
    - "Payment authorization request" is a nickname for an aggregate of data, which needs to be explained in the Glossary.

POS Glossary 1

- Revision History

Version	Date	Description	Author
Inception draft	Jan 10, 2031	First draft. To be refined primarily during elaboration.	Craig Larman

- Definition

Term	Definition and Information	Format	Validation Rules	Aliases
item	**A product or service for sale**			
payment authorization	**Validation by an external payment authorization service that they will make or guarantee the payment to the seller.**			

POS Glossary 2

Term	Definition and Information	Format	Validation Rules	Aliases
payment authorization request	A composite of elements electronically sent to an authorization service, usually as a char array. Elements include: store ID, customer account number, amount, and timestamp.			
UPC	Numeric code that identifies a product. Usually symbolized with a bar code placed on products. See www.uc-council.org for details of format and validation.	12-digit code of several subparts.	Digit 12 i s a check digit.	Universal Product Code
…	…			

POS Domain Rules 1

- Revision History

Version	Date	Description	Author
Inception draft	Jan 10, 2031	First draft. To be refined primarily during elaboration.	Craig Larman

- Definition

ID	Rule	Changeability	Source
RULE 1	**Signature required for credit payments.**	**Buyer "signature" will continue to be required, but within 2 years most of our customers want signature capture on a digital capture device, and within 5 years we expect there to be demand for support of the new unique digital code "signature" now supported by USA law.**	**The policy of virtually all credit authorization companies.**

POS Domain Rules 2

ID	Rule	Changeability	Source
RULE2	Tax rules. Sales require added taxes. See government statutes for current details.	High. Tax laws change annually, at all government levels.	law
RULE3	Credit payment reversals may only be paid as a credit to the buyer's credit account, not as cash.	Low	credit authorization company policy

Domain Rules

- Domain rules (business rules) dictate how a domain or business may operate.
  - They are not requirements of any one application
  - Company policies, physical laws (e.g. how oil flows underground), and government laws are common domain rules.
- It's useful to identify and record domain rules in a separate application-independent artifact
  - this analysis can be shared and reused across the organization and across projects.
- The rules can help clarify ambiguities in the use cases
  - NextGen POS, if the Process Sale use case should be written with an alternative to allow credit payments without signature capture, there is a business rule (RULE1) that clarifies whether this will not be allowed by any credit authorization company.

Evolutionary Requirements in Iterative Methods

Discipline	Artifact	Incep.	Elab.	Const.	Trans.
	Iteration	I1	E1..En	C1..Cn	T1..T2
Business Modeling	Domain Model		s		
Requirements	Use-Case Model	s	r		
	Vision	s	r		
	Supplementary Specification	s	r		
	Glossary	s	r		
	Business Rules	s	r		
Design	Design Model		s	r	
	SW Architecture Document		s		
	Data Model		s	r	