

**SOEN 6481**  
**Software Systems Requirements Specification**  
FALL 2019

**Ticket Vending Machine  
Requirements Specification**

**TEAM F - DELIVERABLE 2**

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November 28, 2019

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# 1 User Story

In software development and product management, a user story is an informal, natural language description of one or more features of a software system. [6]

## 1.1 User Story Format

<b>Title:</b>	<b>Priority:</b>	<b>Estimate:</b>
<b>As a</b> <type of user> <b>I want to</b> <perform some task> <b>so that I can</b> <achieve some goal>		
<b>Acceptance criteria</b> <b>Given</b> <some context> <b>When</b> <some action is carried out> <b>Then</b> <a set of observable outcomes should occur>		

Figure 1: User Story Format

This is the template of our user story for TVM.

## 1.2 Priority Scale

This scale is defined considering the functionality, scope and how critical it is to the system during the further stages of software engineering.[7]

Very Low	Low	Moderate	High	Very High
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## 1.3 Story Point Estimate Scale

A story point is a metric used in agile project management and development to estimate the difficulty of implementing a given user story, which is an abstract measure of effort required to implement it. In simple terms, a story point is a number that tells the difficulty level of the story.[5] **The scale is 1, 2, 3, 5, 8.**

## 2 Personas[8]

### 2.1 Persona : Student

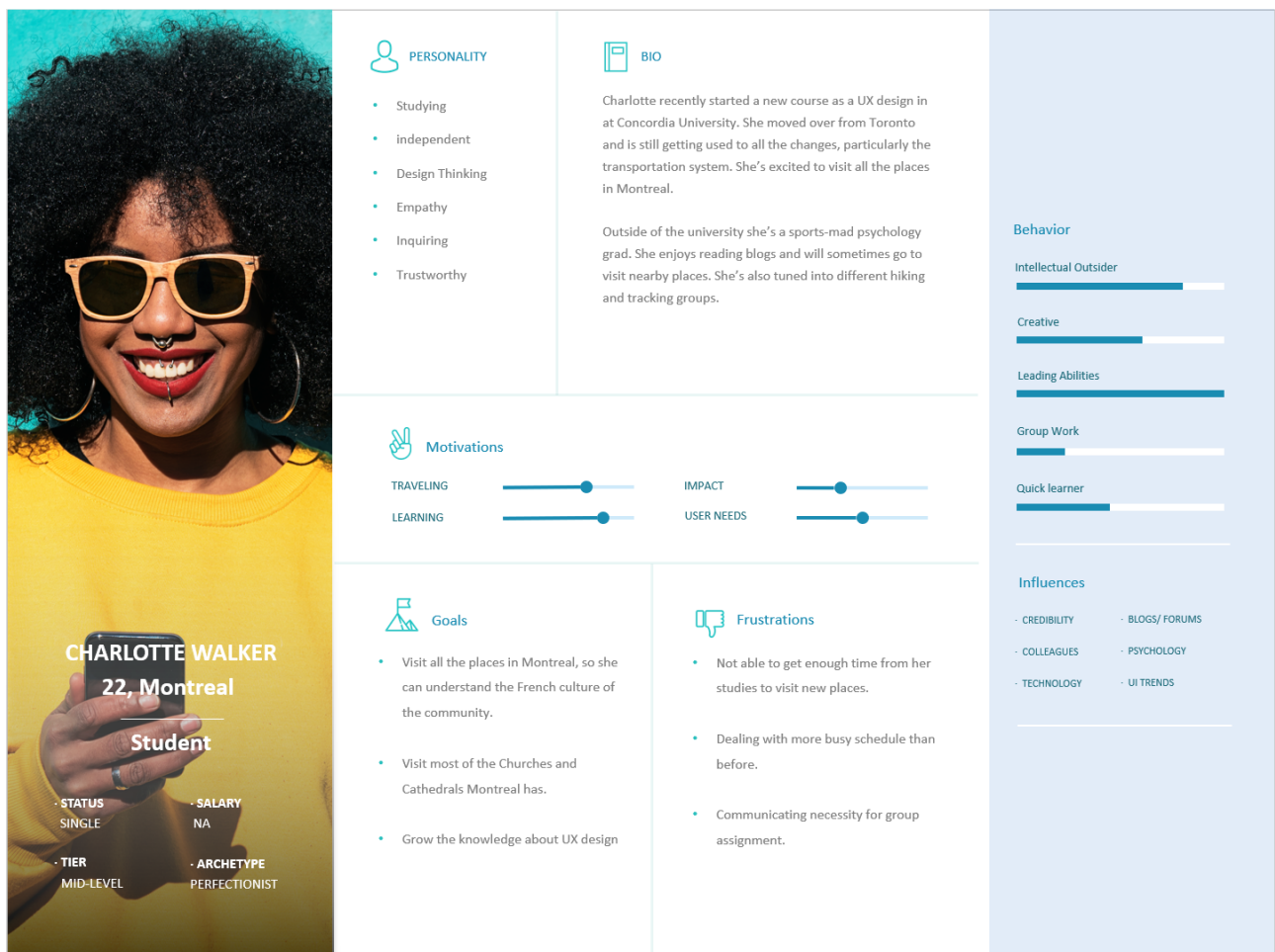


Figure 2: Persona : Student

This persona represents archetypes NOT stereotypes of a broader student segment or group. A student persona summarizes who the student users are and why they are using the TVM, as well as what behaviors, assumptions, and expectations determine their view of the TVM.

## 2.2 Persona : Senior Citizen

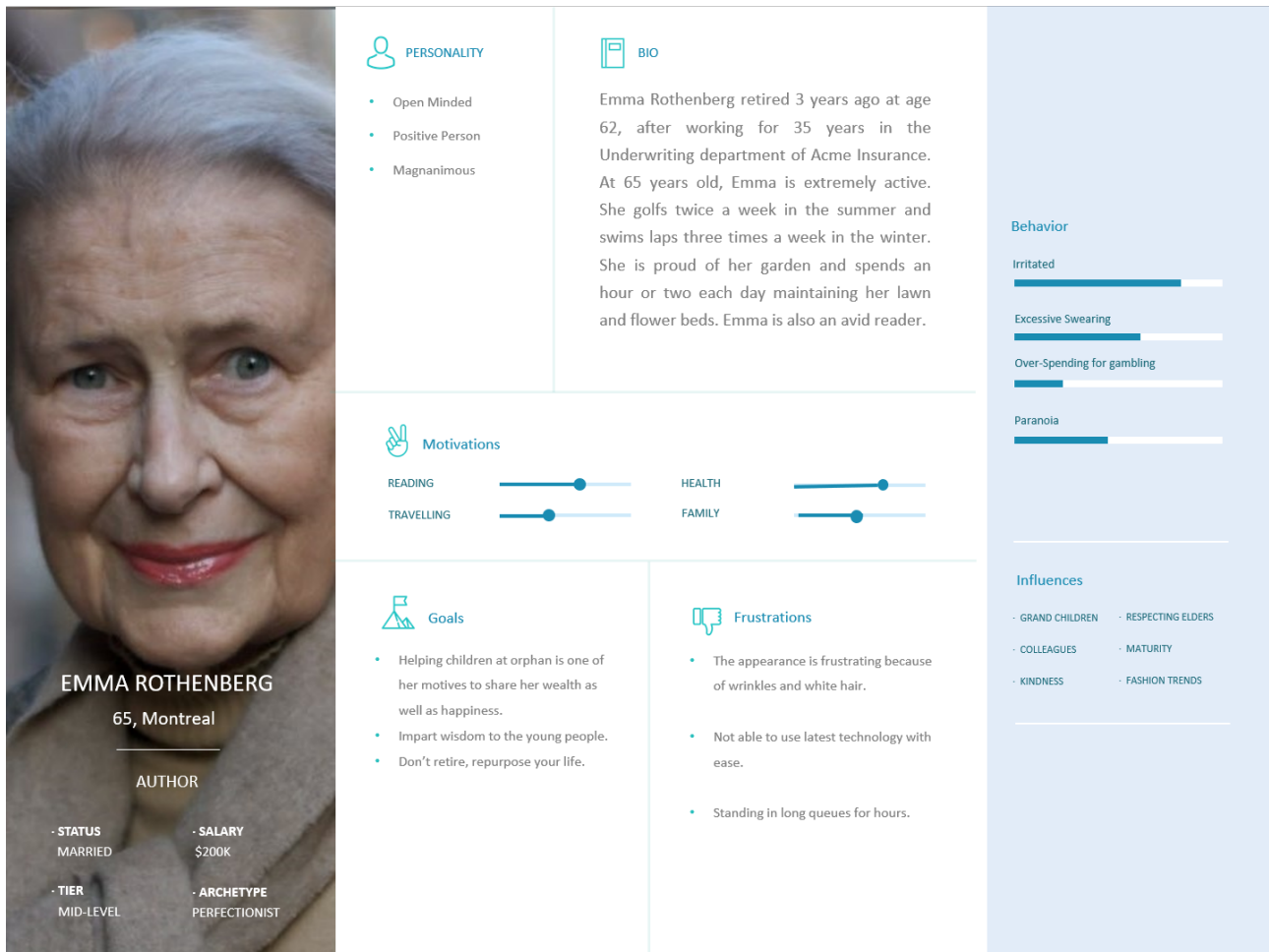


Figure 3: Persona : Senior Citizen

This persona represents archetypes NOT stereotypes of a broader Senior Citizen segment or group. A senior citizen persona summarizes who the old age users are and why they are using the TVM, as well as what behaviors, assumptions, and expectations determine their view of the TVM.

## 2.3 Persona : Hacker

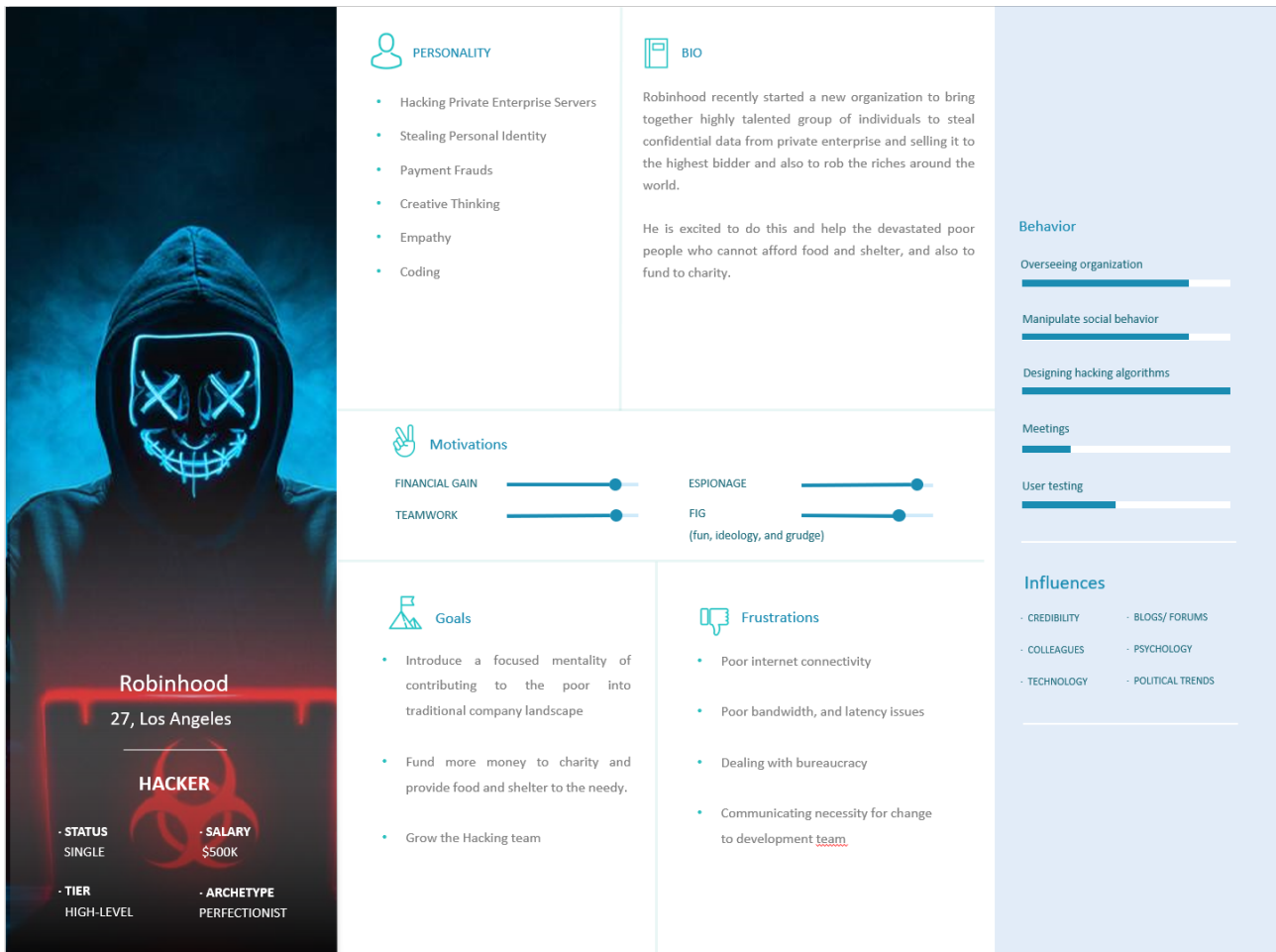


Figure 4: Persona : Hacker

This persona represents archetypes NOT stereotypes of a broader hacker segment or group. A hacker persona summarizes who the hacker users are and why they are using the TVM, as well as what behaviors, assumptions, and expectations determine their view of the TVM.

## 3 User Stories

### 3.1 Constraints

- **Support Sustainability and Productivity :** By tracing our user stories backwards to Use case model, Domain model, Activity Diagram, and Sequence diagram we are able to remove redundant and invalid user stories and test cases which reduces the overall time and cost of implementation of the system and to test them. [2]
- **Support Re-usability :** Implementation of user stories such as payment by cash or card can be reused with many other implementation which uses similar mode of payment with very less modification. Also, implementation of user stories such select preferred language and select type of ticket etc,. can be reused to build Ticket Vending Machine for some other geological location. [1]

### 3.2 List of User Stories

<b>Title : Selection of Language (US01)</b>	<b>Priority : Moderate</b>	<b>Estimate : 1</b>
<p><b>As</b> a commuter I want to select the language (English/French) from the user interface of ticket vending machine.</p> <p><b>I want to</b> choose a language(English/ French).</p> <p><b>So that I can</b> read the instructions/options in familiar language, on the ticket vending machine interface.</p>		
<p><b>Constraints</b></p> <p><b>Support Policy :</b> read the instructions/options in familiar language, on the ticket vending machine interface.</p> <p><b>Support Verifiability :</b> If the commuter select any of the language, TVM user interface should display instructions in selected language only.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that a commuter wants to purchase a ticket but he/she is only familiar with one of the languages. Several reasons such as 1. He/She is an international student and only knows English language, then he/she chooses English language 2. He/She is a native and only knows french language, then he/she chooses french language.</p> <p><b>When</b> the language is chosen, TVM shows further instructions in chosen language.</p> <p><b>Then</b> 2 things happen, 1. Displays different options of tickets 2. Takes them back to the home page(or main page).</p> <p><b>Result</b> Test Pass.</p>		
<b>Formulated By : Dhaval Modi</b>		
<b>Implemented By :</b>		



<b>Title : Selection of Ticket (US02)</b>	<b>Priority : High</b>	<b>Estimate : 2</b>
<p><b>As</b> a commuter who wants to choose the type of ticket (one way / two way / weekly pass / monthly pass) from the user interface of ticket vending machine.</p> <p><b>I want to</b> choose a type of ticket.</p> <p><b>So that I can</b> I can pay for the ticket and commute.</p>		
<p><b>Constraints</b></p> <p><b>Support Decidability:</b> The user can make a decision about which type of ticket he/she wants to buy, for example, one way, two way, weekly pass or monthly pass. The user can also decide to continue to buy a ticket or change their mind to recharge their card.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that a commuter wants to purchase a type of ticket but he/she has many options. Several reasons such as 1. He/She wants to travel for one way, he/she might choose one way ticket option 2. He/She wants to travel somewhere and to come back home, so he/she might prefer two way ticket option. 3. Commuter is only in the city for a week, he/she might take prefer weekly pass 4. For budgetary reasons, he/she might prefer monthly pass.</p> <p><b>When</b> I choose any of the ticket options, the TVM proceeds with the chosen type of ticket.</p> <p><b>Then</b> 2 things happen, 1. Displays different options of payment methods 2. Takes them back to the home page(or main page).</p> <p><b>Result</b> Test Pass.</p>		
<b>Formulated By : Dhaval Modi</b>		
<b>Implemented By :</b>		

<b>Title : Recharge Travel Card(US03)</b>	<b>Priority : Moderate</b>	<b>Estimate : 5</b>
<p><b>As</b> a commuter I want to recharge my travel card because I use public transport frequently.</p> <p><b>I want to</b> recharge my travel card.</p> <p><b>So that I can</b> use public transport facilities.</p>		
<p><b>Constraints</b></p> <p><b>Support Clarity :</b> There is minimal or no ambiguity in this process. The user has clarity that recharging the card will recharge the card and terminate the process.</p> <p><b>Support Validatability :</b> It validates the travel card. For example, it will display a message when recharge is successful which validates that the card is recharged and can be used for the next commute.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that a commuter wants to recharger his/her travel card, they chose the option “Recharge Card”</p> <p><b>When</b> recharge card is selected it, the system asks the commuter to insert the travel card and will take the user through the payment process.</p> <p><b>Then</b> on the success of payment process, the card is successfully recharged and can be used for the commute.</p> <p><b>Result</b> Test Pass.</p>		
<b>Formulated By : Dolly Modha</b>		
<b>Implemented By : Naren Morabagal Somasekhar</b>		

<b>Title : Select Payment Mode(US04)</b>	<b>Priority : Moderate</b>	<b>Estimate : 2</b>
<p><b>As</b> commuter I want to pay for my purchase of a ticket by cash or by the card.</p> <p><b>I want to</b> select the payment mode and proceed to pay in chosen method.</p> <p><b>So that I can</b> complete my payment in the selected mode.</p>		
<p><b>Constraints</b></p> <p><b>Support Clarity :</b> There minimal or no ambiguity in this process. The user has clarity about the mode of payment i.e., he/she wants to either pay by cash or pay by card.</p> <p><b>Support Decidability :</b> User can make a decision about which payment mode they want to select and continue with either by card or by cash.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that the commuter has 2 options for modes of payment either by card (debit/credit) or by cash.</p> <p><b>When</b> Commuter selects the mode of payment i.e., either by card or by cash.</p> <p><b>Then</b> Commuter confirms the payment mode and continues to make the payment in preferred mode.</p> <p><b>Result</b> Test Pass.</p>		
<b>Formulated By : Dolly Modha</b>		
<b>Implemented By : Dhaval Modi</b>		

<b>Title :      Payment      by</b> <b>cash(US05)</b>	<b>Priority : High</b>	<b>Estimate : 5</b>
<p><b>As</b> Commuter selects to pay by cash.  <b>I want to</b> use cash to pay my transaction.  <b>So that I can</b> complete my transaction then get payment receipt (and ticket).</p>		
<p><b>Constraints</b></p> <p><b>Support Policy :</b>    The TVM accepts Canadian cash only in the following denominations:  - 0.25\$, 0.5\$, 1\$, 2\$ coins  - 5\$, 10\$, 20\$, 50\$, 100\$ bills</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b>    payment by cash.  <b>When</b>    the amount of cash inserted equal to or greater than the amount to be paid.  <b>Then</b>    the transaction is paid and completed, receipt (and ticket) are printed and refund is returned.  <b>Result</b>    Test Pass.</p>		
<b>Formulated By : Liangzhao Lin</b>		
<b>Implemented By :</b>		

<b>Title : Payment by card(US06)</b>	<b>Priority : High</b>	<b>Estimate : 8</b>
<p>As commuter I select to pay by card.  <b>I want to</b> insert my credit/debit card and pay my transaction by card.  <b>So that I can</b> complete my transaction then get payment receipt (and ticket).</p>		
<p><b>Constraints</b></p> <p><b>Security specific :</b> There should be connection and validation of the card between TVM and bank in order to process the transaction.  <b>Support Policy :</b> The credit/debit card should have sufficient credit/balance in the selected account to pay the amount.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> payment by card.  <b>When</b></p> <ol style="list-style-type: none"> <li>1.The credit/debit card inserted is valid.</li> <li>2.The card (credit/debit) PIN entered is valid.</li> <li>3.The payment transaction is validated, approved by the Bank and received by the TVM.</li> </ol> <p><b>Then</b> the transaction is paid and completed, receipt (and ticket) are printed.  <b>Result</b> Test Pass.</p>		
<b>Formulated By : Liangzhao Lin</b>		
<b>Implemented By : Dolly Modha</b>		

<b>Title : Cancellation of Transaction(US07)</b>	<b>Priority : High</b>	<b>Estimate : 5</b>
<p><b>As</b> commuter I want to cancel the transaction of a ticket purchase or recharge the travel card.</p> <p><b>I want to</b> cancel an active transaction.</p> <p><b>So that I can</b> start another transaction because I decided to buy a different type of ticket or make a different mode of payment. Or maybe I just move away from the TVM because I changed my mind and don't want to use the transport service.</p>		
<p><b>Constraints</b></p> <p><b>Support Clarity :</b> There is minimal or no ambiguity in this process. The user has clarity that pressing the button cancel will cancel the transaction and terminate the process.</p> <p><b>Support Decidability :</b> The user can make a decision of purchasing a ticket or making payment. For example, the user can decide to continue with the transaction or decide to cancel it by clicking the cancel button.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that a commuter is purchasing a ticket or recharging the card, or making a payment, he/she can decide to cancel the transaction due to several reasons such as 1. to buy a different type, 2. make a different mode of payment 3. Not wanting to purchase the ticket anymore, they can 'hit' the option 'cancel'.</p> <p><b>When</b> the option 'cancel' is selected, the TVM aborts the ongoing active transaction.</p> <p><b>Then</b> 2 things happen, 1. Displays a 'Transaction Cancelled' message to the user of TVM and 2. Takes them back to the home page(or main page).</p> <p><b>Result</b> Test Pass.</p>		
<b>Formulated By : Naren Morabagal Somasekhar</b>		
<b>Implemented By : Liangzhao Lin</b>		

<b>Title : Purchase a ticket(US08)</b>	<b>Priority : Very High</b>	<b>Estimate : 8</b>
<p><b>As</b> a commuter I would like to select the type of ticket.  <b>I want to</b> select the ticket from the available options.  <b>So that I can</b> access the metro for travelling.</p>		
<p><b>Constraints</b></p> <p><b>Usability specific :</b> Commuter who purchases a ticket will not get a refund if he/she wants to purchase another ticket instead.  <b>Security specific :</b> TVM should be able to check for fake currency notes or coins.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> Commuter views the available tickets like one-day, one week, etc.  <b>When</b> Commuter chooses the language and ready for selecting ticket.  <b>Then</b> Commuter selects the ticket and he/she is ready for payment.  <b>Result</b> Test Pass.</p>		
<b>Formulated By : Pruthvi Raju Nallaparaju</b>		
<b>Implemented By :</b>		

<b>Title : Steal Card Information(US09)</b>	<b>Priority : Very High</b>	<b>Estimate : 8</b>
<p><b>As</b> a fraud I want to steal the card details of the user.  <b>I want to</b> get into the TVM and is in a position to steal the data.  <b>So that I can</b> uses the data like card details and PIN in order to steal the commuter money.</p>		
<p><b>Constraints</b></p> <p><b>Security Specific :</b> Due to security issues in the TVM, hackers could be able to get the access of the TVM so that he/she can steal the card information and use it for fraudulent transactions.</p> <p><b>Support Verifiability :</b> If the commuter select any of the language, TVM user interface should display instructions in selected language only.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> that a hacker hacks the TVM system when a user tries to pay by card.  <b>When</b> Commuter enters the PIN.  <b>Then</b> hacker steals the money from commuter bank account.  <b>Result</b> Test Pass.</p>		
<b>Formulated By : Pruthvi Raju Nallaparaju</b>		
<b>Implemented By :</b>		



<b>Title : Payment Fraud(US10)</b>	<b>Priority : Very High</b>	<b>Estimate : 8</b>
<p>As hacker/Fraud or a Bad guy I want to steal money  <b>I want to</b> breach the TVM security and hack the system.  <b>So that I can</b> steal sensitive information such as credit or debit card number and PIN number and steal money.</p>		
<p><b>Constraints</b></p> <p><b>Support Policy :</b> There may be a loophole in the security of the TVM, because of which the Hacker has an opportunity to penetrate into the system and eventually steal money.</p>		
<p><b>Acceptance Test</b></p> <p><b>Given</b> a commuter is purchasing a ticket or recharging the card and making a cashless payment by his/her debit/credit card.  <b>When</b> the TVM user inserts their credit/debit card and enters the PIN number.  <b>Then</b> by sniffing or spoofing the system, sensitive information like card number and PIN number is stolen to make a fraud transaction and steal money.  <b>Result</b> Test Pass.</p>		
<b>Formulated By : Naren Morabagal Somasekhar</b>		
<b>Implemented By :</b>		

## 4 Traceability Matrix

Traceability is a commitment to software requirements management.[3] It is thereby an attribute of a software artifact or of a collection of software artifacts.[4] The table below is a backward traceability matrix for TVM user stories.

User Story	Source
Selection of Language (US01)	<ul style="list-style-type: none"><li>• S1: Use Case Model of TVM and UC01.</li><li>• S2: Context of Use Model of TVM.</li><li>• S3: Domain Model of TVM.</li><li>• S4: Activity Diagram.</li></ul>
Selection of Ticket (US02)	<ul style="list-style-type: none"><li>• S1: Use Case Model of TVM and UC03.</li><li>• S2: Domain Model of TVM.</li><li>• S3: Activity Diagram.</li><li>• S4: Purchase Ticket's sequence diagram.</li></ul>
Selection of Ticket (US03)	<ul style="list-style-type: none"><li>• S1: Use Case Model of TVM and UC04.</li><li>• S2: Domain Model of TVM.</li><li>• S3: Activity Diagram.</li><li>• S4: Purchase Ticket's sequence diagram.</li><li>• S5: Description of TVM.</li></ul>

Selection of Ticket (US04)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC05.</li> <li>• S2: Domain Model of TVM.</li> <li>• S3: Activity Diagram.</li> <li>• S4: Payment Sequence Diagram.</li> </ul>
Selection of Ticket (US05)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC06.</li> <li>• S2: Domain Model of TVM.</li> <li>• S3: Activity Diagram.</li> <li>• S4: Payment Sequence Diagram.</li> </ul>
Selection of Ticket (US06)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC07.</li> <li>• S2: Domain Model of TVM.</li> <li>• S3: Activity Diagram.</li> <li>• S4: Payment Sequence Diagram.</li> </ul>
Selection of Ticket (US07)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC08.</li> <li>• S2: Domain Model of TVM.</li> <li>• S3: Interview Transcript.</li> </ul>

Selection of Ticket (US08)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC03.</li> <li>• S2: Domain Model of TVM.</li> <li>• S3: Activity Diagram.</li> <li>• S4: Purchase Ticket Sequence Diagram.</li> <li>• S5: Description of TVM.</li> </ul>
Selection of Ticket (US09)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC09.</li> <li>• S2: Domain Model of TVM.</li> </ul>
Selection of Ticket (US10)	<ul style="list-style-type: none"> <li>• S1: Use Case Model of TVM and UC10.</li> <li>• S2: Domain Model of TVM.</li> </ul>

This table shows how the user stories can be traced back to the source which are Use case model, Domain model, Activity diagram, and Sequence diagram.

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