

4 Appendix - Project Description

4.1 Your Client

The *Kelburn Postal Service* (KPS) handles a large volume of domestic and international mail. KPS cooperates with a range of transport firms (sea-based, air-based, and land-based) to carry mail to their destinations, and charges customers for this service based on the weight, volume, origin, destination, and priority of the mail being sent.

All mail that goes through KPS originates in New Zealand, and may be delivered either domestically within New Zealand or internationally to an overseas sea/air port where it is then handled by a local mail service partner. The internal workings of the foreign mail services when delivering their own local mail are beyond the scope of this project.

Customers can post mail through KPS at various sites around New Zealand. For the sake of simplicity, it is assumed that mail is transferred from an actual mailbox to a local distribution centre (and vice-versa) for free and instantaneously. There are seven such distribution centres in New Zealand: Auckland, Hamilton, Rotorua, Palmerston North, Wellington, Christchurch, and Dunedin.

Mail originating in New Zealand can be sent from one distribution centre to another, or it can be sent internationally to a sea/air port of another country. For the sake of simplicity, it is assumed that all mail to a country goes to the same port. Mail destined for an international sea/air port may need to go through other countries' sea/air ports, depending on the routes that transport firms are currently offering.

Customers can specify a priority for their mail. The higher the priority, the more expensive it is for the customer. International air priority requires the mail to be transferred by air. International standard priority requires that the mail be transferred by land or sea (unless air transfer is the only option). Domestic air priority and domestic standard priority are the same.

The price customers are charged is based on priority, volume, weight, and destination. All New Zealand domestic destinations are considered the same for the purposes of charging the customer.

Some restrictions to note: KPS does not accept mail for destinations if there is no chain of transport routes to that destination. KPS does not accept international air priority mail for destinations if there is no transport route to that destination solely consisting of air freight once that mail has left New Zealand. KPS does not accept domestic air priority mail for destinations if there is no transport route solely consisting of air freight.

4.2 The Business Case

KPS is looking for a software system that helps them to process business events. Based on an initial market study an expert panel at KPS came to the conclusion that there is no off-the-shelf software available that would meet all the requirements of KPS. Rather it was decided to develop a completely new software system. As KPS does not have sufficient software engineering expertise in-house, the chief information officer (CIO) of KPS decided to contract this development project to the SWEN 301 students. **This is where you come into play.** Your team is asked to develop the new *KPSmart* software system.

Envisioned Usage of *KPSmart*

KPSmart is used by KPS clerks and managers to fulfill a range of tasks that are typical for their work:

- **Event Processing:** The major purpose of *KPSmart* is the processing of business events (such as, for example, mail delivery, the opening of new routes, or price changes). Whenever a new business event occurs a KPS clerk will enter all relevant data for this event. This is done by keyboard or mouse through the Graphical User Interface (GUI) of *KPSmart*.
- **Business Monitoring:** *KPSmart* allows KPS clerks and managers to monitor a range of key business figures (such as, for example, revenue, expenditure, or average delivery times). Whenever a business event is processed, these business figures are recalculated, and updated on the GUI of *KPSmart*.
- **Event Logging:** *KPSmart* keeps track of processed business events. Whenever a business event is processed, it is recorded in the log file of *KPSmart*. Whenever *KPSmart* is restarted, it first reads the log file to account for all the historic business events. This ensures that *KPSmart* uses the correct business figures before KPS clerks can enter new business events through the GUI.
- **Decision Support:** *KPSmart* allows KPS managers to study the development of their business over time. This helps them to analyse the success of individual routes, and to make decisions in the best interest of the company. At any time a KPS manager can use the GUI to revisit the business events stored in the log file. This is done by keyboard or mouse through the GUI. *KPSmart* offers commands to step/run through the sequence of business events (stored in the log file) forward and backward. After each step the business figures shown on the GUI will be refreshed accordingly.

Business Events processed through the GUI

Here is a list of the business event types that are entered through the GUI and processed by the system:

- **Mail Delivery:** A request for delivery of single item of mail from one location to another. Relevant data includes: origin, destination, weight, volume, time of entry into the system, and the priority.
- **Customer Price Update:** Notification of a price change to KPS customers. Relevant data includes: the origin and destination locations that the price change affects, the mail priority this price is applicable to, along with the new *price per gram* and new *price per cubic centimeter* that will be charged to customers.
- **Transport Cost Update:** Notification of a cost change being charged by a transport firm. This includes the origin and destination of the route affected, the name of the transport firm, type of transport available (that is, land, sea, or air), the new *price per gram* and *price per cubic centimeter*, the day of the week the transport departs for the destination, the frequency it departs (the hours between two subsequent departures from the origin), and the duration of the trip (in hours).

Note: For the sake of simplicity, new routes are opened just by providing a first transport cost update for that route.

- **Transport Discontinued:** Notification that a particular route by a particular transport firm is no longer available. This includes the origin and destination of the route affected, the name of the transport firm, and the type of transport that was offered (i.e. sea, land or air).

Business Events stored in the Log File

Processed business events will be stored in the log file. For each business event a new data record is attached to the existing log file. *KPSmart* uses Extensible Markup Language (XML) for data records. Here an example is given for each business event type to illustrate the respective XML data format.

- Data formats for Mail Delivery events, and for Transport Cost Update events:

<pre> <mail> <day>Monday</day> <to>Rome</to> <from>Wellington</from> <weight>100</weight> <volume>5</volume> <priority>International Air</priority> </mail> </pre>	<pre> <cost> <company>Air NZ</company> <to>Rome</to> <from>Wellington</from> <type>Air</type> <weightcost>6</weightcost> <volume>6</volume> <maxWeight>350</maxWeight> <maxVolume>50</maxVolume> <duration>16</duration> <frequency>36</frequency> <day>Thursday</day> </cost> </pre>
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- Data formats for Customer Price Update events, and for Transport Discontinued events:

<pre> <price> <to>Rome</to> <from>New Zealand</from> <priority>International Air</priority> <weightcost>6</weightcost> <volume>8</volume> </price> </pre>	<pre> <discontinue> <company>Kelburn Airways</company> <to>Sydney</to> <from>Wellington</from> <type>Air</type> </discontinue> </pre>
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Note: A template for the log file is provided via the course web site. Note that the log file may not be well designed. Please feel free to modify the template to suit your needs.

Key Business Figures shown in the GUI

Here is a list of the key business figures that are shown in the GUI and kept up-to-date when processing business events:

- **Total Revenue:** The amount of revenue generated from mail that has been received into the delivery system. All revenue is generated by charging customers for the mail that they request to be delivered.
- **Total Expenditure:** The amount of expenditure caused by paying transport firms to carry the mail to their destinations.
- **Total Number of Events:** The number of events that have been processed to generate the current report.
- **Amount of Mail:** The amount of mail (by total volume and total weight and total number of items) delivered to each destination from each origin.
- **Average Delivery Times:** The current average delivery time for each type of mail by (priority, origin, destination) triple.
- **Critical Routes:** A list of (destination, origin, priority) triples where the average delivery costs KPS more than the average customer is paying, including the average (per item) difference between revenue and expenditure for that route.

Some Simplifications to keep the Project Tractable for You

There are a number of simplifications from how an actual mail service works that are not considered here. Most noteworthy amongst these are that:

- costs such as staff and capital expenditure are not considered, and
- mail originating from overseas for New Zealand destinations is delivered at no cost (and with no revenue to KPS) in exchange for international mail originating in New Zealand being delivered by local mail services overseas for free whenever KPS delivers it to their sea/air port.

This is not realistic, but makes the project more achievable in the time allowed. There may be other discrepancies you notice as well. Feel free to mention these on the forum - unless it is a mistake on my part I'll probably just pass it off as a simplification.