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Allowing data sharing activities to the right users can be determined by concerned access control through assisting every attempt made by a user, to access a resource in an application system. The interests of authorized users who are protected by access control, can provide a safe, secure and accessible working environment. Implementation of access control involves three important issues, which include policies, models and mechanisms. The appointed administrator has the authorization to manage the access of data sharing under every possible circumstance by specifying the model of access control as high-level requirements for policy mechanisms. Commonly, most application systems rely on an administrator to manage access control policies which may lead to conflicts between users' and the administrator's empowerment. Such conflicts exist due to lack of involvement from end-users in handling the access control. Another issue raised is that of unrevolved services, which occur frequently due to massive and complex policy details that need to be handled by the administrator. Additionally, most programming languages and programming environments do not naturally support implementing policy for access control. Nevertheless, the policy needs to be coded as part of the system development for managing access control. Furthermore, access control policies are high-level features, which require high cost maintenance. This thesis examines the control mechanisms in data sharing activities among collaborative users. The results of the research undertaken offers a model that allows data owners to provision access control policies in collaborative data sharing environments via a specific programming language. The model supports dynamic owner-centered empowerment of data access control policy that allows data owners to have control of their own data. The policy can change dynamically according to the data owners’ needs during collaborative sessions. The proposed model also facilitates explicit access control mechanisms for the data owner to secure his or her data. The investigation uses real life observation on an uncontrolled environment of public and private data sharing as a method to identify missing mechanisms for data owner’s access control empowerment. A banking system is selected to examine the existing access control mechanism by using an abstract scene approach. This is achieved through observation and the examination of both the existing and non-existing mechanisms, in order to accommodate the data sharing process. In addition, this research extends the experiment through a small-scale case study using a controlled variation of the rules for a modified scrabble game to uncover a list of control policy states. Both findings are modeled and prescribed in the form of language constructs to accommodate the solution and testing. Therefore, a set of language constructs are designed and implemented on an existing scripting language JACIE (Java based Authoring language for Collaborative Interactive Environments) that allows rapid prototyping on the result and testing. Major extensions on JACIE are performed to verify the model. This model will significantly accommodate a comprehensive framework of data sharing among different levels of organizations (government and private sectors) in wider perspectives.

Service disruptions in rail transport services often lead to trains cancelations and delays. The disruptions can create conflicts in the use of tracks and platforms and further propagate the disruptions throughout the railway system. The challenge in rescheduling trains is to quickly find the solution to the problem by synchronising resources to minimise the effect of the disruption. Railway rescheduling involves real-time alteration of train schedules in a railway network which is highly interconnected. Mathematical modeling for trains rescheduling has always been considered as a difficult and heavily constrained combinatorial optimisation problem that involves a large number of hard (operational) constraints and soft (desirability) constraints and the complexity of problem increases with the number of decision variables and constraints. Modelling and solving railway rescheduling problem is thus considered a highly complex task and categorised as an NP-hard class problem. This study is concerned with solving the railway rescheduling problem when disruption occurs on a track segment of the railway. Among the objectives of the study are to analyse the causes of railway disruptions and delay problems and to develop the visual railway network topology for the local Komuter rail system. The main contribution of the study is the formulation of a Mixed Integer Goal Programming (MIGP) model that determines a rescheduled timetable, generated based on trains priority rules, which are outlined according to the types of trains. The model aims at achieving two goals, where the first objective function is to minimise the total delay time of all trains in the network, while the second objective function is to maximise the train service reliability. A novel heuristic algorithm named as Headway and Order Scheme (HOS) is introduced to solve the rescheduling model. The approach considers the headway restriction and the sequence order of conflicting trains as its main feature. The headway restriction is formulated based on a new concept of block-oriented headway, whereas the sequence order is formulated based on the priority of conflicting trains. The model is solved by means of preemptive goal programming technique, using MATLAB r2014a, which automatically generates the optimal solution to the problem. Experimental analysis with incident scenarios based on different train priorities on Malaysian double track railway is examined to evaluate the performance of the proposed model and solution approach. It focuses on Komuter trains services and disruption incidences, which are mainly caused by signaling switches problem that takes a duration of five to fifteen minutes of time. The computational results show that the model is able to produce the provisional timetable in short computing time of 36 seconds. In addition to this, the total delay time and service reliability generated are strongly influenced by the setting of the train priorities. The solution generated successfully satisfies the restrictions posed by the rail operator and subsequently enables the goals of the model to be achieved. The verification of model was done by comparing the analytical solution generated in terms of the specification made by the new sets of constraint of the proposed model, while model validation was carried out by means of sensitivity analysis and face validation techniques. Besides the MIGP model and solution approach, the study has also developed a user interface for Komuter trains rescheduling support system.