Refactoring industrial-strength code - refining code toward better design
by Usman Parvez

Abstract: Good software design leads to a reusable system that is easier to extend and evolve. Better object-oriented design always leads to more modular, flexible and robust system. Factors like time and resource constraints in industry result in compromise of good object-oriented design. Adding features or extending legacy systems is always very difficult. Software Refactoring allows to change the internal structure of a software system without changing its observable behavior. Refactoring doesn’t guarantee that the performance of the system would improve but make its maintainable and extensible. In this thesis, we understand an industrial code, identified different code smells and provided appropriated refactoring technique for more readable and modular system. Further we have suggested code smells and there appropriate refactoring technique that have not been listed by Martin Fowler.

Conditional logic detection for identifying the opportunity of design pattern application
by Amina Mukhtar and Fakhar Lodhi

Abstract: Design patterns are used to make the object-oriented system more flexible in order to adapt frequent changes. However, their absence in the system may introduce anti-patterns which makes it hard to maintain and evolve. Thus it may be useful to introduce the design patterns to make the system more flexible and maintainable. Introducing design patterns requires detecting anti-patterns in the system and suggesting their appropriate design patterns by which they can be replaced. Each anti-pattern has a particular structure in the code, which can be used as a tool for its detection. However, there are more than one anti-patterns which use similar structure in the code to solve the problem. In this paper, we have tried to resolve this conflict and provide detection criteria for each conditional anti-pattern solving the design problems for which the design pattern solutions have already been proposed. These anti-pattern detection criteria can be used to suggest their corresponding design patterns and thus facilitate the design pattern introduction in the software systems.

Classification of scattered code in object-oriented applications
by Maliha Mansoor and Usman Bhatti

Abstract: Aspect-oriented programming strives to encapsulate crosscutting concerns into modular units called aspects. Aspect Mining techniques aim to search for aspect candidates in existing software systems. These techniques associate all occurrences of scattered code in existing applications with the absence of aspects. In this paper, we demonstrate that in a poorly designed object-oriented system, scattered code can also originate from the absence of objects. On the one hand it will be erroneous to associate the occurrences of scattered code originating from the absence of objects with the absence of aspects. On the other hand such scattered code should be separately classified as it identifies refactoring opportunities. In this paper, we first present patterns that are similar to the patterns searched by aspect mining techniques but these patterns originate from the
absence of proper object-oriented design. Based on these patterns, we construct a tool that distinguishes between scattered codes arising due to the absence of different encapsulating units: objects and aspects. Hence, the tool differentiates between aspect-oriented and object-oriented refactoring opportunities. We validate our findings on different software systems.

A framework for automation of extended primitive refactoring guidelines addressing client and test code adaptation
by Wafa Basit, Fakhar Lodhi and Mohammad Usman Bhatti

Abstract: Refactorings are considered behavior preserving if these perform equivalence transformations that do not change the external behavior of the software system but only improve the internal structure of the code. Opdyke in his thesis presented a set of twenty six low-level refactorings. Using these refactorings he has defined a set of three more abstract, high-level refactorings. He claims that a particular set of syntactic and semantic properties of programs is found to be easily violated if explicit checks are not made before a program is refactored. Among these properties ‘Scope’ of the refactored object is one of critical characteristics. In his work, the scope of the refactored objects has been restricted to the object and its inheritance hierarchy. The effect on clients and unit tests has been totally ignored. Hence, the resultant software does not preserve behavior. Therefore, in this paper we present a framework for adaptation of clients and unit tests for all primitive refactorings defined by Opdyke.

Practice of usability engineering in SDLC
by Samia Asloob Qureshi and Qaiser Duranni

Abstract: Usability is an increasingly important competitive issue in the software industry. Software usability engineering is a structured approach to building software systems that meet the needs of users in various environments with varying levels of computer experience. In this paper, we understand the need of usability practices and integrate it into software development lifecycle. This paper reports the results from a recent study done to observe the practices of usability engineering during software development lifecycle in Pakistan software industry. A questionnaire survey was made to gather information on the usability tasks and to what extent they are integrated in software development lifecycle. The results shows that majority of the organizations understand the importance of usability tasks but unable to fully integrate it in software development lifecycle.

SMART MANAGER (Project Management Tool)
by Burhan Rasool, Muhammad Rauf Ayub, Aqib Javed, Muhammad Imran Iqbal, Sadia Manzoor and Qaiser Duranni

Abstract: According to Tom DeMarco[1], Managing a software project involves heart, gut, soul and nose. So lead with the heart, trust your gut (trust your hunches), build soul into the organization, develop a nose for bullshit. One of the ways of learning and teaching this is to create an environment more or less similar to that of the Industry and go through all the different tools, techniques and methodologies which should ideally be followed in a Software development environment and see their impact on the schedule, cost and quality of the software project. This paper is about our experiences and findings in going through a similar exercise as part of our final year research project of Masters Degree program in Software Project Management.

Refactored test plugin (a tool for refactoring test cases)
by Lehmia Kiran and Fakhar Lodhi
Abstract: Refactoring improves the design of software and makes software easier to understand by eliminating code smells, but manual refactoring are often error-prone and time-consuming. To help refactoring developers avoid these problems, automated tools are available for refactoring in almost all major object oriented programming languages. The problem with these automated tools is that test case refactoring is not supported: when the code is changed using refactoring, it becomes inconsistent with the test cases. So our eclipse java “Refactored Test Plugin” provides automated support of refactoring which refactor source and also their corresponding tests.

An approach to deal with dynamic nature of requirements in timetabling problem
by Usman Aftab and Fakhar Lodhi

Abstract: In this paper an approach to deal with dynamic nature of requirements in timetabling problem is presented. As it goes from one region to another, requirements to generate timetable change. This raises a need to have a general method which can be integrated with already known timetabling algorithms without affecting their original flow and make them even more generic so they can be used anywhere without any adjustment in the code when requirements are changed.

Urdu dependency parsing - a data-driven approach
by Wajid Ali and Sarmad Hussain

Abstract: This paper describes a data-driven dependency parsing approach for parsing Urdu sentences based on dependency tagset and Urdu Dependency Treebank which was developed during this research. A 40000 words corpus is manually tagged with phrases tags like VP, NP, JJP and RBP. Position of a particular token in a particular sentence is also manually tag and lastly head of each particular token is tagged manually. By using three manually annotation schemes, a token position marking, phrase boundary and head of a token tagging, Urdu Dependency Treebank was build. Then dependency relations tagset based on Grammatical related is used to annotate the dependency relation in the Treebank corpus. This final corpus is used for data-driven dependency parsing approach. MaltParser, a transition based data-driven dependency parser is used for experiment to parse the sentences. The parser achieves a maximum label attachment score of 72.1%.

Standardizing implementations of ISO-8583
by Muhammad Umar Khayyam and Adnan Noor Mian

Abstract: Financial organizations (e.g. Merchants, Banks, Bankcard Networks and Issuers) communicate each other via ISO-8583 or Web Services to complete request and response cycle of card-originated transactions originated from ATMs, POS or webs. Although ISO 8583 and web services are well accepted ways to communicate but still there are some limitations. Each time a financial organization needs to extend its network may need to make changes in its software implementation of ISO-8583. It is because ISO 8583 does not address the all variations made by different organizations to accommodate required differences. This paper is based on the experience gained from software house and deals with standardizing implementations of ISO-8583. We analysis different implementations of ISO-8583’s and then it proposes a way to standardize its implementations so that one organization can communicate with other without making any changes in the software each time.

A hybrid approach to urdu verb phrase hunking
by Wajid Ali and Sarmad Hussain
**Abstract:** A variety of verb phrases exist in Urdu including simple verb phrases, conjunct verb phrases and compound verb phrases. This paper explains the structure of Urdu verb phrases, and details a series of experiment to automatically tag them. A 100,000 word Urdu corpus is manually tagged with VP chunk tags. The corpus is then used to develop a hybrid approach using HMM based statistical chunking and correction rules. Initially, a statistical baseline model is developed. The technique is enhanced by changing chunking direction and merging chunk and POS tags. The automatically chunked data is compared with manually tagged held-out data to identify and analyze the errors. Based on the analysis, correction rules are extracted to address the errors. By applying these rules after statistical tagging, further improvement is achieved in chunking accuracy. The results of all experiments are reported with maximum overall accuracy of 98.44% achieved using hybrid approach with extended tagset.

**Multiple fault tolerance for MPLS networks**
by Muhammad Kamran and Adnan Noor Mian

**Abstract:** Developing efficient and reliable networks are very important now a day, because every organization wants secure and low recovery time networks. Fault tolerant technique is considered to be the most powerful method to construct the high credibility networks. In this paper we are introducing a novel fault tolerant technique for Multiple Faults in Multi-Protocol Label Switching? (MPLS) networks, which specifically covers the domain of Protection Switching. We used the Network Simulator NS2 for simulation of the desired results, when multiple faults occur in the MPLS network.

**Gear tooth designing with cubic bezier transition curve**
by Wafa Tahir, Fakhar Lodhi and Usman Bhatti

**Abstract:** This paper describes the method of designing a Spur Gear Tooth using an S-shaped transition curve joining two tangent circles. For this purpose a single segment of cubic Bezier curve has been used as a transition between two tangent circles of same diameter. This transition curve not only maintains G2 Hermite like conditions but also guarantees not more than one inflection point in its curvature plot. A shape control parameter is also available to modify the shape of transition curve in a stable manner.

**Smoothing arc splines using cubic bezier spiral transitions**
by Aisha Rashid and Zulfiqar Habib

**Abstract:** Arc splines are planar, tangent continuous, piecewise curves made of circular arcs and straight line segments. They are important in manufacturing industries because of their use in the cutting paths for numerically controlled cutting machinery, highway route and robot paths. This paper considers how to smooth three kinds of G1 biarc models: the C-, S-, and J-shaped, by replacing their parts by a single G2 cubic Bezier function. All kinds of transition curves have just one inflection point in their curvature. Use of a single curve rather than two functions has the benefit because designers and implementers have fewer entities to be concerned.

**Smoothing an arc spline using PH quintic spiral transitions**
by Iffat Fayyaz and Zulfiqar Habib

**Abstract:** This paper describes a method to smooth an arc spline. Arc splines are G1 continuous segments made of circular arcs and straight lines. We have proposed a smooth version
of arc spline by replacing its parts with C-, S-, and J-shaped spiral transitions, stitched with G2 continuity, by using a single segment of Pythagorean hodograph quintic function. All kinds of transition curves have just one internal curvature extremum. Use of a single curve rather than two has the benefit because designers have fewer entities to deal with. Arc splines are important in manufacturing industries because of their use in the cutting paths for numerically controlled cutting machinery, highway or railway designing, and non-holonomic robot path planning.

Using PH quintic transition curves in gear tooth designing
by Iffat Fayyaz and Zulfiqar Habib

Abstract: This paper describes the method of designing a spur gear tooth using an S-shaped transition curve joining two tangent circles of the same radius. For this purpose a single segment of a PH quintic Bezier curve has been used as a transition curve. This transition curve not only maintains G2 Hermite like end conditions but also guarantees not more than two extrema in its curvature plot. A shape control parameter is also provided to modify the shape of transition curve in a stable manner while keeping the important geometric features of the transition curve.

Modified adaptive filtering with averaging algorithm for colored noise cancelation in speech signals
by Maimoona Akram and Syed Amjad Hussain Shah

Abstract: In many applications of noise cancellation, it has been noticed that the signal characteristics change quite rapidly. So noise cancellers, with short training time and high tracking rates, are needed. These requirements turn our attention to the utilization of adaptive algorithms with high convergence rates. The recursive least squares (RLS) algorithm is said to be the best choice, from this point of view, but this algorithm has high computational complexity and stability problems. Adaptive filtering with averaging (AFA) is used in such conditions, because of its high adaptation rate and low computational complexity as compared to RLS. A modification in existing AFA algorithm to improve the performance in terms of signal to noise ratio is examined (compared with AFA) and is illustrated on colored noise added to speech signals.

Implementation of system identification with pipelined LMS adaptive algorithm using xilinx system generator for DSP
by Muhammad Sulman and Syed Amjad Hussain Shah

Abstract: In this paper, a novel tool (System Generator for DSP) from Xilinx has been used to implement LMS algorithm for System Identification in Matlab Simulink. The Algorithm has been implemented using a pipelined architecture to increase throughput of the system without incrementing multipliers. The system fairly models the desired patterns to recognize it adequately. Additionally, a timeline diagram is also provided to visualize the pipelined architecture.

Image denoising using wavelet domain techniques
by Aman Ehsan Kazi and Syed Amjad Hussain Shah

Abstract: This paper focuses on the removal of noise from an image using the wavelet transform. Images captured by digital imaging devices often contain noise. In literature many algorithms exist for the removal of white uncorrelated noise. In this paper a de-noising method is proposed based on the correlation between the image pixel values in the wavelet domain. The results are compared with a few wavelet domain image de-noising algorithms.