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An Evaluation of JavaScriptas a Virtual Teambuilding Enabler using Draught

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Abstract: Many organizations today have teambuilding strategies as part of their official training curriculum aimed at improving employee performance by enhancing cohesion, creativity, organization and problem solving abilities. As a perfect teambuilding solution for maintaining a more productive and focused virtual team, gaming has emerged as a powerful tool for employee engagement that changes behavior, improvesskill development and enhance creativity and innovation [1]. This paper examines JavaScript and Web Sockets using draught to achieve a real time P2P interactive game that can be used as a virtual team building social software tool.

Keywords: Gamifcation, Teambuilding, JavaScript, Web Sockets, Checkers/Draught.

I. INTRODUCTION

Most corporates today maintain virtual teams stationed at various locales in pursuit of cost cutting, maintaining competitiveness and increasing productivity. The growth of these virtual organizational models have been accelerated by the ICT infrastructure [2] that has increased the ease, efficiency and speed of performing tasks especially after rapid electronic information and communication media development such as the internet experienced in the past decades [3].However, this geographical disparity has had a negative impact on coordination, visibility, communication and cooperation [4] amongst team members.A team can be understood as a group ofpeople who communicate with each other in order to achieve shared goals [5]. [6]Concurs by adding that the shared goals are predetermined and have some value. A virtual team can therefore be seen as a team whose members are stationed invarious locationsconnected with the aid of ICT to accomplish an organizational task [7].

Teambuilding is an initiative of bringing both new and existing team members together to aid their experiential learning in consideration of their values and interpersonal dynamics for skill development [8]. It can also be used to improve staff cohesion [9]. To achieve this, teambuilding has key components that aid it and which are: communication, collaboration, commitment, cohesion, conflict resolution, problem solving, and goal sharing amongst others.Due to limited available online web-based teambuilding activities for virtual teams that can serve these objectives, computer games present a valid approach to teambuilding [2] than face-to-face games mainly because they are cheaper, safe, save time and present players with an opportunity to experience more different options.

The main aim of introducing games at the work place is not to offer fun but instead to offer a positive and engaging experience deemed interesting and important to employees. The intellectual challenge and resultant satisfaction of a well play usually serve as a critical motivational factor for many people to indulge in skillful games [10]. [11]Formidably justifies the potential of gaming at the work place when they developed three games in their project Second Life which was designed to improve collaboration between participants and team building skills. They were able to observe that the games enable role information, cooperation and communication between team members and elicit social behaviors like spontaneous celebrations such as dancing, drinking (virtually) champagne together on game completion especially with high scores.

The aim of this study is to convert the draught that has traditionally been played physically on a board by two participants, to an online, real time web-based game that can be played by two players in different geographic locations using JavaScriptand Web Sockets. Previous existing computerized versions of Draught such as Strachey's in 1952, [12, 13], PAASLOW developed in the late 1970's by Eric Jansen et al. [14], Martin Byrant'sColosus of 1989; 1991, Gil Dodgen's Checkers of 1989; 1991 andChinook by Schaeffer et al within the same period[15, 16], all involve playing against a computer hence making them inadequate teambuilding tools. Although there are some computerized draught implementations that provide P2Pinteractivity, both players must however use the same computer since they are not web-based and therefore insufficient for virtual teambuilding.

II. THE ARCHITECTURE

The prototype draught game is implemented using an authoritative model using a client-server approach. In this architecture, the server controls the game, notifying the clients every time the game state changes in order to update their respective states locally. For instance, if a player picks and drops a piece to another square, the transition information is sent to the server which checks the validity of the action before updating the state of the game and informing the other client of the new status.

Although from its inception around 1995 JavaScript has mainly supported web application clients, it has since transformed from being used to build complex clients to web servers, games and desktop applications development[17]. JavaScript is therefore used here to develop both the client and the server modules of the draught game prototype. The client is implemented using AngularJS which is an open-source JavaScript framework used to make single-page web applications where the browser only loads the main page once then makes asynchronous calls to the server to fetch new information.AngularJS's dominance is rapidly increasing as

a JavaScript framework for professional web development.The game data being transmitted between the client and the server is represented as JSON mainly due to the fact that modern browsers already offer native JSON support and data is already represented as a JavaScript object which means fewer bits are being passed across the wire, and less machine time is required to process data (on either end). This ensures a rich user experience that does not require unnecessary page reloads or waiting between actions is maintained throughout the game session.

The server side is implemented using Node.js, a server-side JavaScript environment based on Google's V8 runtime engine used by Google Chrome browser [18]. Node.js takes advantage of JavaScript's support for event callbacks and functional paradigm to effectively achieve parallelism to enable faster and more efficient execution. To serve files, do complex routing, perform client authentication and manage sessions, Node.js is supported by a web framework called Express which perfectly fits into the stack between another JavaScript real-time web applications development framework called socket.io used to implement Web Sockets in this prototype. Socket.io is a powerful and flexible server and clientside component that enables a full-duplex communication between web clients and the server. It primarily uses the Web Socket protocol which facilitates live content streamingand the creation of real-time games by providing a standard means for the server to invoke and send data to the client without being solicited while allowing data to be passed back as the connection is kept open. Socket.io seamlessly ties into Node.js and together with Express when connected, it serves the client-side game files and data resulting in aclean and easy integration.

III. THE PROTOTYPE (DRAUGHT)AS A TEAMBUILDING TOOL

Draught, also known as Checkers (in North America), is a very popular game in both the United States of America and the British Commonwealth [10] and one which has been heavily researched on since the early 1950s in the computing field of artificial intelligence. One of the earliest notable publications was in 1756 by William Payne titled "An Introduction to the Game of Draughts" with the world championships being established in 1840 [19]. Although there are different variants of the game such as the "international" draught, popular in Netherlands and the former Soviet Union which is played on a 10 x 10 board[10], the prototypediscussed here is based on the checkers model which is played on an 8 x 8 board. To play the game, checkers only moveone square forward with the promoted ones (kings), having the freedom to move one square in any direction. This promotion is realized when a checker reaches the last rank of the board.

The prototype implements the Go-As-You-Please (GAYP) version which unlike the initial traditional draught that imposes a strict must-jump rule [19]; a player has the freedom to strategically forego a jump but without penalties. The game initiator is assigned the red pieces and accorded the privilege to make the first move while his/her opponent takes the green pieces. As the game progresses, players are expected to take turns and are informed adequately when it is their turn to move their pieces. In case of a jump, the game engine checks for any additional possibilities of more jumps by the jumping piece. If there are more jumps available, the engine gives both players the power to move pieces rendering the game open. Should there be no more available jumps, the player is locked from movement to enable the other player move their pieces. The game ends in a win if a player has no more available pieces or moves. Figure 1 and 2 below shows the prototype's screen shots with a sample game in progress.

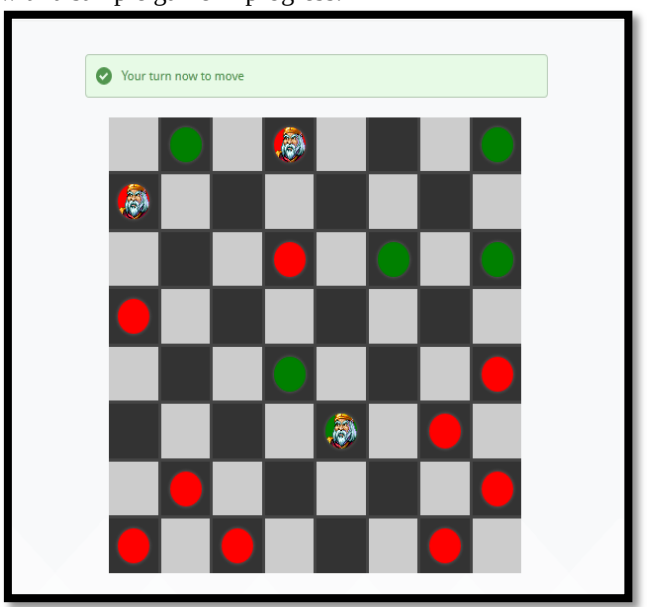

Figure 1: Draught Board Game; Player 1

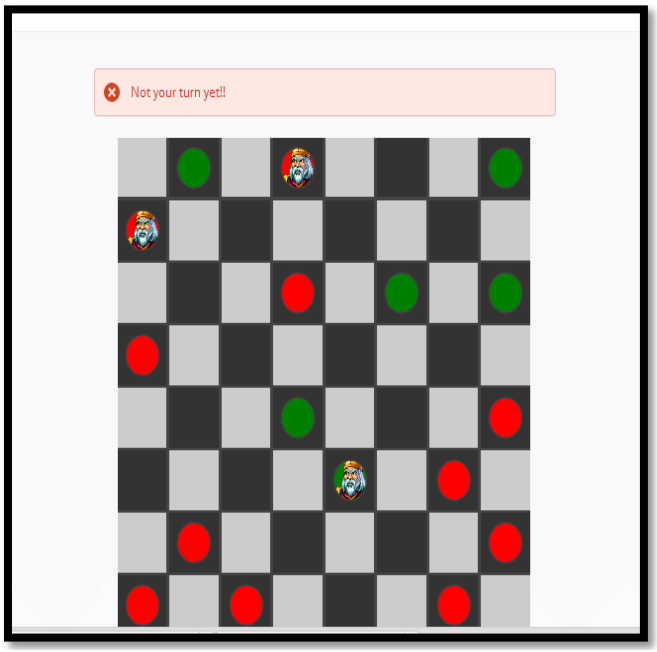

Figure 2: Draught Board Game; Player 2

Teambuilding is a designed intervention to improve effectiveness in how team members work together and resolve problems [20]. Different types of teambuilding exist for intervention facilitation [21, 22] and which are used by organizations for different purposes such as interpersonal relationship improvement, boosting motivation, change programs alignment, define direction and resolve conflicts [23]. Due to [24] a lack of agreed-on standard set of teambuilding techniques, we cannot categorize draught as belonging to a particular class but instead we can evaluate it based on factors such as its contribution towards goal-

setting, role definition, interpersonal process skills, cohesion building and problem-solving.

One of the greatest draught players of the 1920s, Louis Ginsberg [25] once said that "draughts is primarily a game of strategy" and which Asa Long [25], another great player, agreed requires serious planning. A former American Champion, Wm. F. Ryan puts it clearly that strategy in draughts is the objective or the overall plan of play with tactics providing support to these objectives [25]. The great Derrick Oldbury[25] goes further to explain that when a player is making an overall draught game plan, they are strategically planning their approach which might involve, for instance, which square to occupy with their pieces and then employ tactics to help achieve these aims such as preventing an opponent from occupying the squares using threats. Based on these advices from former world champions, it's clearly evident that a frequent and good draught player is a strategic and tactical thinker who is accustomed to proper planning before embarking on implementing a well calculated move with usually carefully chosen and strategically positioned checkers.In comparison to a business environment, the checkershere can be viewed as the team or products/services that can be deployed strategically to outdo competitors and win the market. This means that as team members play a game, they not only learn to be creative in calculating their next moves (a factor that improves innovation), but they also learn to appreciate the critical role that each piece (which can be loosely interpreted to mean team members or the product range that a company offers) play in line with the overall objective which is to win the game by being profitable and becoming a market leader.

IV. CONCLUSION

In this paper, we have examined virtual teams and demonstrated through draught; how JavaScript can be used to build real-time web-based games that can be deployed as virtual teambuilding tools. As our discussions herein has shown, games as teambuilding tools have been widely accepted by corporates due to their contribution towards enterprise success. This paper has shown that JavaScript can be used to actualize virtual teambuilding fully from the client to the server side.

V. REFERENCES

[1]. Brian Burke; "Gamification: Engagement Strategies for Business and IT". Gartner Inc. November 2012, http://www.gartner.com/technology/research/gamification/

[2]. Nader Ale Ebrahim, Shamsuddin Ahmed and ZahariTaha. "Virtual Teams: a Literature Review". Australian Journal of Basic and Applied Sciences, 3(3): 2653 – 2669 by INSInet Publication 2009.

[3]. Hertel, G.T., S. Geister and U. Konradt, 2005. "Managing Virtual Teams;A Review of Current Empirical Research". Human Resource Management Review, 15: 69-95.

[4]. Valentin Casey and Ita Richardson: "Project Management within Virtual Software Teams". Published intheInternational Conference on Global Software Engineering, 2006(ICGSE '06), pp. 33 – 42.

[5]. M. Woodcock, D. Francis:"Organization Development through Team Building", Published by John Wiley & Sons,New York, 1981.

[6]. E. Salas, "Team training and performance", Science Agenda, vol. 6(1), pp. 9-11, 1993

[7]. A. M. Townsend, S. De Marie and A. R. Hendrickson: "Virtual teams:Technologyand theworkplace of the future". Academy of Management Executive, vol. 12(3), pp.17-28, 1998.

[8]. S. J. Liebowitz, K. P. De Meuse, "The application of team building", Human Relations, vol. 35(1), pp. 1-18, 1982.

[9]. P. G. Hanson, B. Lubin, "Team building as group development", in Team Building: Blueprints for Productivity and Satisfaction, National Institute for Applied Behavioral Science, 1988, pp. 76-78.

[10]. J. Schaefer and R. Lake, "Solving the Game of Checkers", Games of No Chance, MSRI Publications, Vol. 29, 1996.

[11]. J. B. Ellis, K. Luther, K. Bessiere, and W. A. Kellogg, "Games for virtual team building", Proceedings of the 7th ACM Conference on Designing Interactive Systems, 2008, pp. 295 - 304.

[12]. A. L. Samuel, "Some studies in machine learning using the game of checkers", IBM J. Res. Devel. 3(1959), 210-229.

[13]. A. L. Samuel, "Some studies in machine learning using the game of checkers: recent progress", IBM J. Res. Devel. 11 (1967), 601-617.

[14]. Truscott, T. 1978. The Duke Checkers Program, Technical Report, Duke University.

[15]. D. N. L. Levy and D. F. Beal, "Heuristic Programming in Artificial Intelligence: The First Computer Olympiad", Published by Ellis Horwood Ltd, Chichester, England, in 1989.

[16]. D. N. L. Levy and D. F. Beal, "Heuristic Programming in Artificial Intelligence: The Second Computer Olympiad",Published by Ellis Horwood Ltd, Chichester, England, 1991.

[17]. RafelAuler et al; Addressing JavaScript JIT engines performance quirks: A crowdsourced adaptive compiler; Proceedings of Compiler Construction - 23rd International Conference, CC 2014.

[18]. S. Tilkov and S. Vinoski. Node.js: Using JavaScript to Build High-Performance Network Programs. IEEE Internet Computing, 14(6):80–83, 2010.

[19]. R. Pask, "Checkers in a Nutshell", written for Martin Fierz, The American Checker Federation, 2007.

[20]. Boss, R.W. 1983. 'Teambuilding and the problem of regression: the Personal Management Interview as an intervention', Journal of Applied Behavioral Science, 19(1): 67–83.

[21]. Hayes, N. 1997. "Successful Team Management", Thomson Business Press, London.

[22]. Brawley, L.R. &Paskevich, D.M. 1997. 'Conducting team building research in the context of sport and exercise', Journal of Applied Sport Psychology, 9: 11–40

[23]. Kriek, H.S. 2007. "A survey of the prevalence and nature of teambuilding interventions in South African

organisations", Paper presented at the 12th conference of the Eastern Academy of Management in Amsterdam, the Netherlands.

[24]. Levi, D. 2001;"Group Dynamics for Teams". Sage Publications, London, pp. 322.

[25]. Checkerschest, "Checkers Strategy and Advise from the Checkers Greats", http://www.checkerschest.com/checkers/strategy6.htm