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Enhancing Regulatory Compliance in the National FinTech Ecosystem: A Centralized RegTech Approach

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Abstract
This study looked at a centralized regtech approach to improving regulatory compliance in the national financial technology ecosystem. The study's specific goals are to design a FinReg/FinTech ecosystem using the new National Financial Ontology (NFO) model and investigate the issue of information overload using a cost-effective algorithm in the program. This was tested using the big o time notation to show that the size of the data does not affect processing time. Centralization of regulatory technology (RegTech) is a crucial method to strengthening regulatory compliance and control in the fast evolving financial technology (fintech) sector. The Object-Oriented methodology (OOM), which focuses on encapsulating the behavior and structure of information systems into compact modules, is the approach used in this study.

Keywords: Artificial Intelligence (AI), Central Bank of Nigeria (CBN), Financial Technology National Financial Ontology (NFO)

1. Introduction

Prior to the COVID-19 epidemic, FinTech was seeing a gradual but steady increase in the financial market. FinTech had a rapid increase in growth worldwide at the beginning of the pandemic when it emerged as an online alternative to the traditional funding system for the implementation of COVID-19 safety [21, 3]. Nowadays, FinTech affects every aspect of the financial system in almost every country in the globe. The biggest impact, though, may be seen in China, where tech companies like Tencent, Baidu, and Alibaba (BATs) have revolutionized the financial sector and created new difficulties for authorities. Additionally, since 2016, authorities have been actively involved in comprehending the dynamics of the FinTech business and working to build policies in a number of nations, including the US, Australia, Singapore, and the UK.

The financial services sector (FSI) has been striving for the implementation of Asset Standards (III) and FinTech regulation [5]. The 2008 Global Financial Crisis (or "GFC") brought about an unforeseen shift in the character of financial markets, services, and institutions due to regulatory and technological advancements. The swift advancement and maturation of FinTech necessitates an analogous progression and advancement in RegTech. The word "RegTech," a portmanteau of "regulatory" and "technology," refers to the application of technology, specifically information technology (or "IT"), to regulatory compliance, reporting, and monitoring. RegTech, or regulatory technology, is the term for the application of technology to assist businesses in effectively and economically complying with regulations. The UK and Singapore have been actively involved in comprehending the characteristics of the FinTech business and looking for.

The intricacy and quantity of regulatory regulations have increased in tandem with the fintech industry's growth. In RegTech, centralization refers to the merging of compliance activities, data management, and regulatory processes into a unified system. Numerous jurisdictions have conducted trials utilizing centralized RegTech models, providing insightful information regarding their execution.

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A centralized regulatory strategy with both accomplishments and challenges is the General Data Protection Regulation (GDPR) of the European Union. Despite the fact that GDPR has significantly increased consistency among member states, it has also drawn criticism for being too complicated and burdensome for enterprises [1, 21, 6]. RegTech's rise can be attributed to the following factors: (1) post-crisis regulatory adjustments necessitating massively increased data disclosure by monitored entities; (2) developments in data science (for instance artificial intelligence (‘AI’) and deep learning), which allow the structuring of unstructured data; (3) economic incentives for participants to minimize rapidly rising compliance costs; and (4) regulators’ efforts to enhance the efficiency of supervisory tools to foster competition and uphold their mandates of financial stability (both macro and micro) and market integrity.

Centralization in RegTech refers to the consolidation of regulatory data, compliance processes, and oversight mechanisms into a unified system. This can involve central databases, integrated compliance platforms, and centralized regulatory frameworks that streamline the collection, analysis, and reporting of regulatory information. A centralized data repository can streamline data management by providing a single source of truth for compliance-related information.

Specific Objectives

The general objective of this paper is to examined enhancing regulatory compliance in the National financial technology Ecosystem: A Centralized RegTech Approach.

a. Solved the problem of Information overload using cost effective algorithm in the program and this was tested using the big o time notation to show the data size does not affect the time it takes to convert financial regulation into machine readable form.
b. Design a FinReg/ FinTech ecosystem using the new New National Financial Ontology (NFO) model

2. Review of Related Literature

Applying technology to regulation makes it easier to monitor financial market participants who are becoming more and more dispersed due to the emergence of new FinTech start-ups. RegTech offers the means to transition towards a proportionate risk-based approach where access to and management of data enables more granular and effective supervision of markets and market participants [12, 13, 14]. Due to financial limitations and legal obligations, financial incumbents and regulators are moving toward replacing human decision-making procedures with automated ones [17]. Also, it seems that the 2021/22 lag that Innovate Finance documented was really a transient obstacle. The creation of more effective risk management instruments, processing automation, and enhanced regulatory change tracking and the streamlining of data governance are all potential outcomes of successful technology deployment that should free up time for more compliance-value-added tasks. Although there has been a pause in global growth and the apparent "positive attitude" toward fintech apps. It may be that 2021/22 is only a halt in the long-term expansion of the sector since predictions for the future of the fintech business remain upbeat. Because of this, businesses should continue to think about investing in technology, as well as in the infrastructure and skill sets that support it [20].

Financial technology has the power to radically alter the financial industry. [8] Study on Bank of England/Financial Conduct Authority (FCA) RegTech Sprint initiatives aimed to show how RegTech can enable straight-through processing of regulations and regulatory compliance reporting through the use of semantically enabled applications. The model created for their study has the following limitations:

1. There is a flaw in the current system called the hazards of a fragmented Tower of Babel approach.
2. Their system's information overload, which raises the possibility of information loss, is another noteworthy drawback.
3. Furthermore, AI failed to significantly address the underlying problem of "natural stupidity" in financial experts and senior managers, as well as in financial engineers and quants [16]. This problem also persisted in those working in banks and general business organizations, as well as in those accountable for systemic fraud and misconduct in the banking system [11, 6. 4].

A broad range of topics are covered by financial regulations, such as reporting (such as capital and liquidity returns), transactional monitoring (such as Money Laundering and Fraud), client identity management (such as Know Your

Client), risk management (such as scenario analysis and stress testing), and more [21]. Nearly every division of the bank, including finance, trading, customer-facing companies, and Treasury, is impacted by regulations.

Von and Langerman [22] developed the Smart Digital Treasury Model (SDTM), which provides a Treasury with a clear digital transformation plan to assess its digital maturity and guide the effective implementation of new technology. The Smart Digital Treasury Model (SDTM) was developed to support and guide the construction of a next-generation smart Treasury. The model depicted in Figure 1 is made up of the following four phases, or building blocks:

Step 1: Digital maturity evaluation evaluates a Treasury's digital maturity based on a range of standards and rates, as well as its degree of digitalization and readiness across important digital dimensions.

Step 2: involves creating a business case and evaluating the available digital tools. The best digital technology is chosen based on the use cases for the tools. This is done to guarantee that the implementation will produce the desired results and that Treasury will successfully move toward a more developed state in terms of digital technology.

stage 3: Digital Road Map for Technology Implementation – This stage outlines the implementation strategy and development approach (such as DevOps, Agile, or Lean) for implementing the new digital technology that has been chosen.

Step 4: Management of new digital technology and dangers. In Treasury, managing the modifications, elevated threats, and risks brought on by digitalization is a crucial factor. A focused strategy is consequently necessary for digitalization.

This framework can be expanded to include some of the regulatory management demands and thereby deliver an integrated and effective RegTech solution as part of the Smart Digital Treasury Model (SDTM) framework.

Von and Langerman [22] looked more closely at how RegTech might be implemented into a bank department's digital transformation plan, like Treasury. This would imply that both strategic Treasury management activities and regulatory reporting requirements might be supported by the use of digital technology. A clever Treasury function is produced by this integration. In Figure 2.

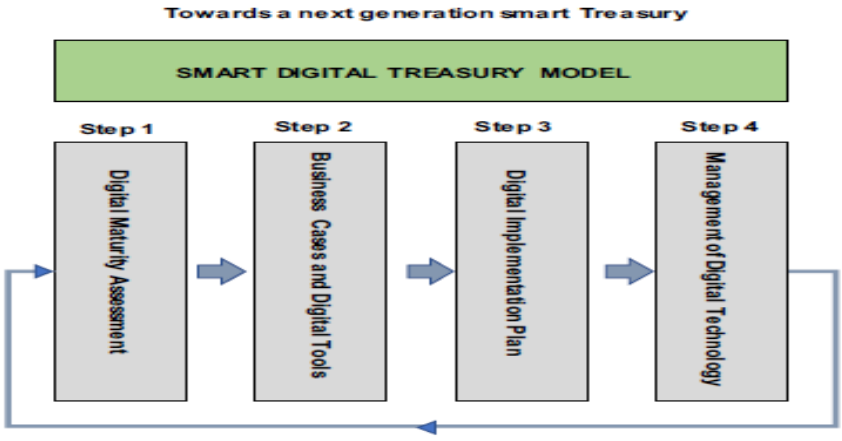

Figure 1: Smart Digital Treasury Mode (Source: Von and Langerman, (2020))

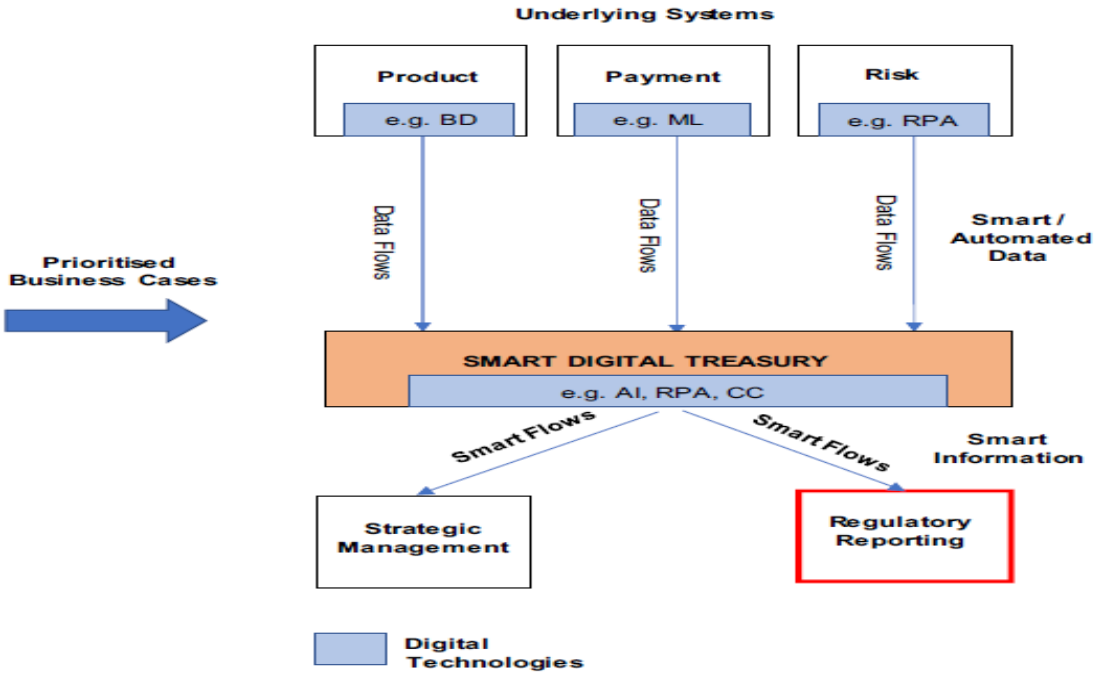

Figure 2: Regulatory Smart Digital Treasury Model using Robotic Process Automation
Source: Von, (2020)

The benefits of deploying Robotic Process Automation (RPA) for Treasury regulatory activity include: automated systems can operate 24/7; it improves granularity and frequency of updates; it reduces FTE required; minimizes error rates; it integrates relatively well within existing IT landscape; it can be trained by humans; and it leads to redeployment of Treasury staff to more strategic functions. The building of the collective business case for implementing these kinds of innovations inside Treasury will be strengthened by the joint use of digital technology for management and regulatory purposes. If digital technology solutions are used for both management and regulatory-driven goals, measurements like Return on Investment will be greatly increased. Different benefits of regulatory technologies could all contribute to a better and more intelligent regulatory management process. Robotic Process Automation (RPA), which has relatively simple application advantages, stands out among the technologies. RPA may greatly simplify the operational and labor-intensive data extraction procedure, freeing up Treasury staff to work on more strategic and ethereal management tasks like evaluating the reporting output and utilizing the data to guide business decisions.

The study of Eyitope *et. al.* [7], FCA [8] and MAS [12] establish case studies of the UK and China to examine the different national financial regulatory approaches to fintech as a new form of platform-based political economy. The UK's approach to regulation is based on platforms, and start-up and early-career platforms are included in a financial regulation system that encourages innovation while balancing stability and consumption. Meanwhile, steps are being taken in China to strengthen the regulations and limitations placed on FinTech platforms. FinTech growth spearheaded by BigTech was pushed to speed up financial reforms to support economic growth and ensure authoritarian state control, but it has now become clear that regulation is really acting against the rise of platform dominance.

Also, Voigt & Bussche [20] and Von [21] further stated that, regulators now attempt to improve future market development and financial stability through technology as they have realized that a retroactive approach centered on the risks behind the prior crisis is not the way ahead. Regtech and Suptech have the potential to change how financial institutions and regulators, respectively, comply with and monitor regulatory standards, much how Fintech has changed how financial

service providers operate. The "Regtech" phenomenon is not just a trendy term. It creates incalculable savings for both the financial sector and regulators. Nevertheless, in Schizas & Kanini [17], Von [21] and Von & Langerman [22] article, it has shown how the anticipated universal adoption of Regtech has been slowed down by the risks and constraints related to its development, integration, and operation.

3. Methodology

The methodology adopted in this study is the Object-Oriented methodology (OOM) which focus on capturing the structure and behavior of information systems into modules that combines both data and process. This methodology supports decomposition and re-composition to handle any system irrespective of it complexity, disassembled this system into its components often expressed as objects for ease of understanding. The Microsoft Visual studio was used for analysis and design as it provides versatile Unified modelling language (UML) tools which are the major tool set for object-oriented analysis and design.

Phase 1: Digital Regulatory Alerts: created taxonomies of regulatory topics using the World Wide Web Consortium (W3C)'s RDF and OWL to semantically tag regulatory provisions to indicate their scope and application so alerts could be generated.

1) Phase 2: Making Regulations Digital by using smaRT; SmaRT applies the Semantics of Business Vocabulary and Business Rules (SBVR) standard proposed by Object Management Group. SBVR enables business subject matter experts to capture and express their vocabularies and rules in a systematic way according to FIPO model of RDF and OWl first-order deontic-alethic logic.

2) Phase 3: Performing Digital Regulatory Reporting

The knowledge embedded in the SmaRT a FIPO model based vocabulary was used by software engineers from FinTech operators such as Hitachi, Regnosys, and ombard Risk to map firm-specific data concepts in the nonymized customer account data supplied by Santander to equivalent concepts in the Regulatory Knowledge Base.

Analysis of the Existing System

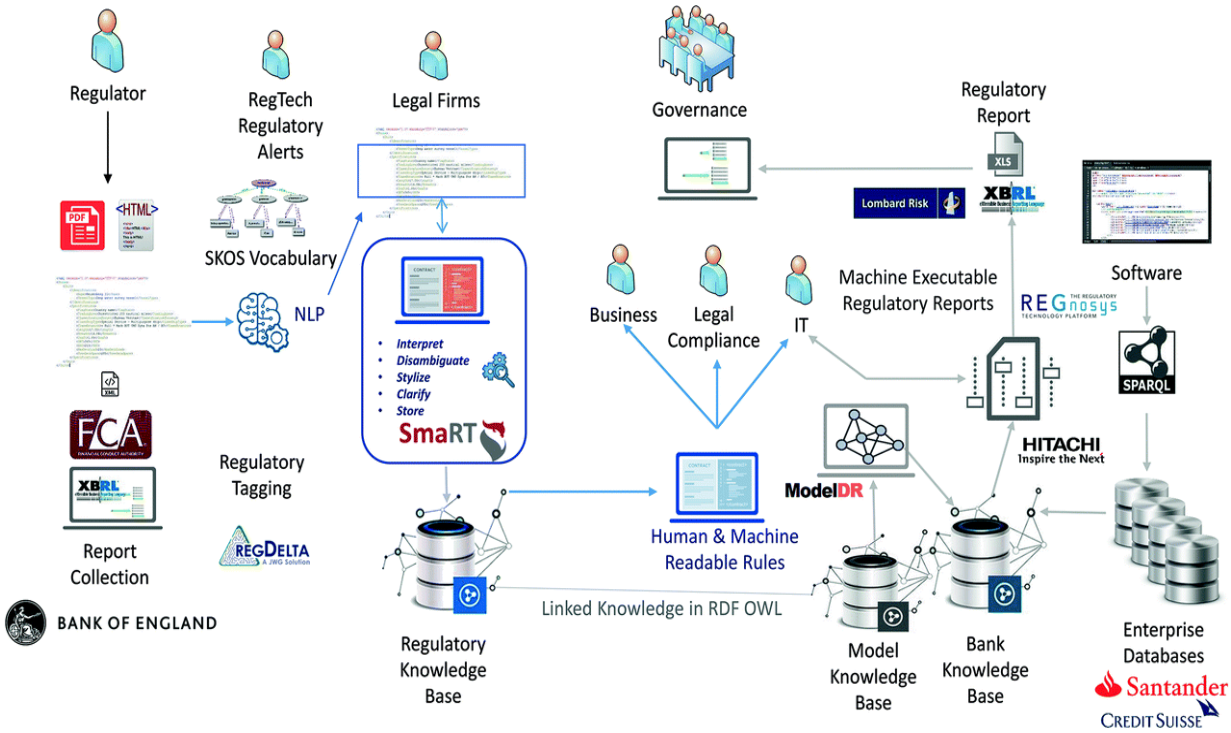

Figure 3 Model of the Existing System (Source: Bank of England by Tom Butler & Leona O'Brien, (2018)

3) Phase 4: Creating Meta-Data Models for Semantic Interoperability

ModelDR semantic modelling application was used to create ontology-based meta-data models, based on SmaRT vocabularies and rules, that help scale up the findings and make Digital Regulatory Reporting a reality in the Enterprise

Analysis of the proposed system

A centralized RegTech solution based on National Financial Ontology (NFO) which is derived from Ontology web language (OWL), Resource Description Framework (RDF) and Open Mathematical Document (OMDOC) to model the financial technology platform and incorporate the national regulatory frameworks for FinTech companies can bring a lot of benefits to the financial industry. The proposed system adopts the Bank of England model with a modification to increase the performance of the overall system as illustrated in Figure 3. The proposed system is divided into four phases with a central Regulation Technology (RegTech), a control agency - in this case the Central Bank of Nigeria (CBN) and the Payment Services Banks (PSBs), acting as the FinTechs.

Software model

The software model was developed using a text editor called Notepad++ and WAMP Server 2.1, Visual Studio 2022 Community Edition, Microsoft Structured Query Language (MSSQL) 2014 and WONDERSHARE EDRAWMAX UML software

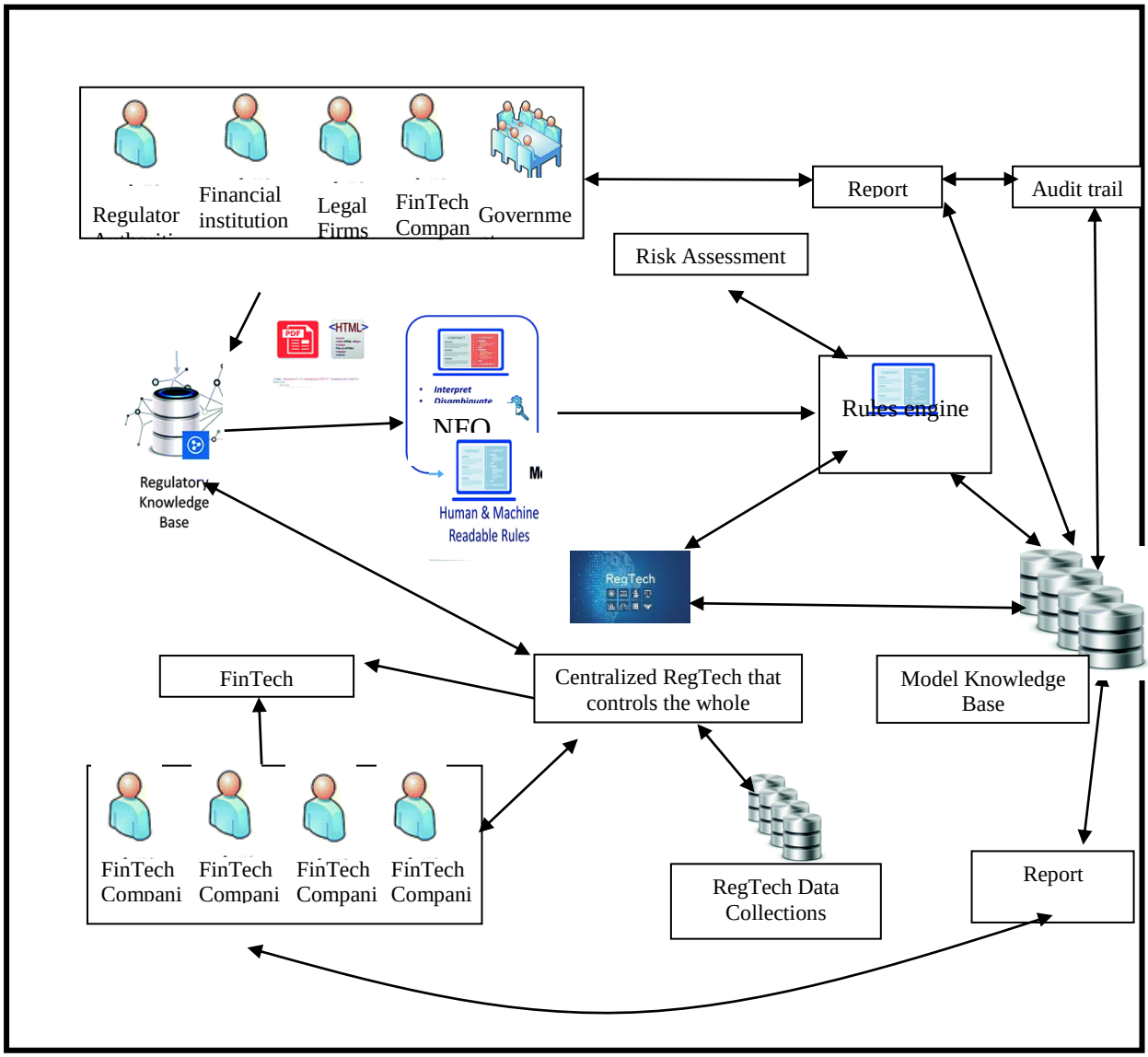

Figure 4: Proposed Model for A centralized RegTech Model for Computerized Control of National FinTech Ecosystem

A. Design and implementation

Generally, Use Case diagram graphically depict the interaction between the system and the users. The diagram graphically decides who will use the system and in what ways the user expects to interact with the system. For the purpose of clarity, and adhering with the provisions of the Object-oriented Analysis (OOA), the actors identified in the central REGTECH system include the CBN, PSB, PSB Customer etc. The use case diagram of PSB registration on the REGTECH. CBN which is in other words regarded as the "Control Bank" provides prospective PSBs with a platform (REGTECH) for PSB services inclusion, the CBN which has total control of the REGTECH system provides integration interface for the PSB to integrate their Fintech system. The provision extends to mandating the PSB to comply within the stipulated time.

The PSB depends of the mandate given by the CBN to integrate their Fintech system. Furthermore, the CBN verifies the features and Okays or rejects the integration as the case maybe, then feedback is sent to the PSB, the PSB customer complaints use case diagram. The essence of having customer complaint window is to ensure PSB would not practice something different than what is on the REGTECH platform all shows in the conceptual model that represents the model of the real world expressed in terms of the data requirements established. We employed class diagrams in representing these data requirements. For simplicity reasons, the conceptual model of the system is centered on the CBN as everything in the system revolves around the CBN REGTECH.

Figure 6: shows the database specification of the system. From Figure 6, the class names, the attributes, constraints, methods that operate on the classes, and relationships among the model classes, are clearly shown. The physical model is the blueprint for real-life database implementation which the software interact with**.**

4. Results and Discussion

The application design phase involves the design of all the components of the application program. The view design pattern was used in this project because it is a Web application. The user interface is very important to every user in a client/server environment. The reason is that whereas, the application program may offer what is required to achieve its pre-set objectives; the presentation (user interfaces) may prevent the user from achieving anything meaningful. The user-centered design was used to offer a rich user experience in Figure 5 is the index Page/ home page of the REGTECH system which is the landing page users see once they access a website. It usually shows information about the website in addition with a link (in form of a button or text hyperlink).

From figure 6, the administrative (control) page of the entire REGTECH system is displayed. In the figure, the administrator can do the following from the menus: View applications, Add new regulation, View complaints and Initiate sanctions. Other possible operations on this window are: View regulatory policies, View approved PSBs and Suspended PSBs. The Payment Service Banks (PSBs) home window contains menus for: Viewing regulation, Viewing sanctions related to each PSB, Viewing Complaints against PSB.

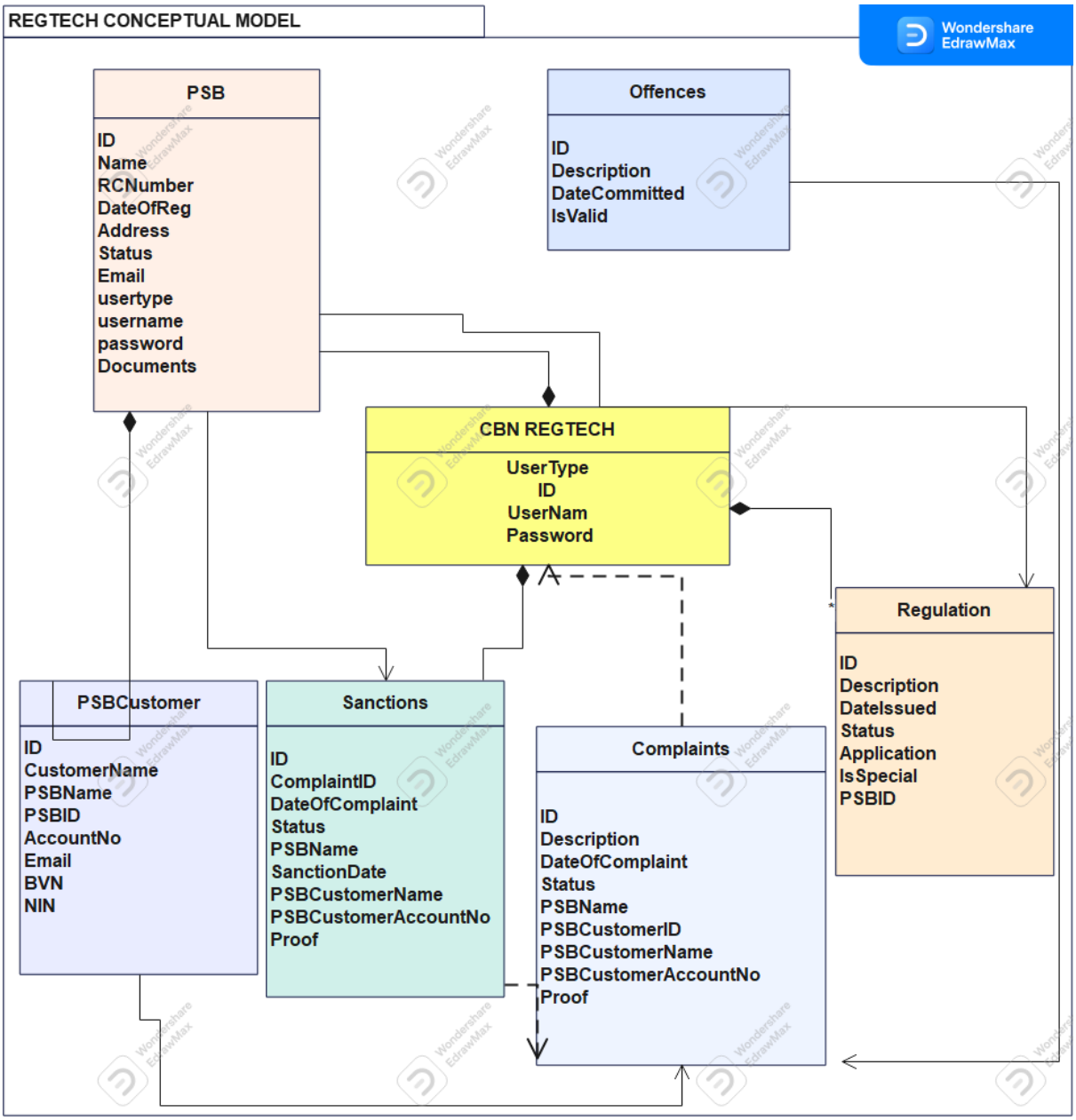

Figure 5: Conceptual Model of the New System

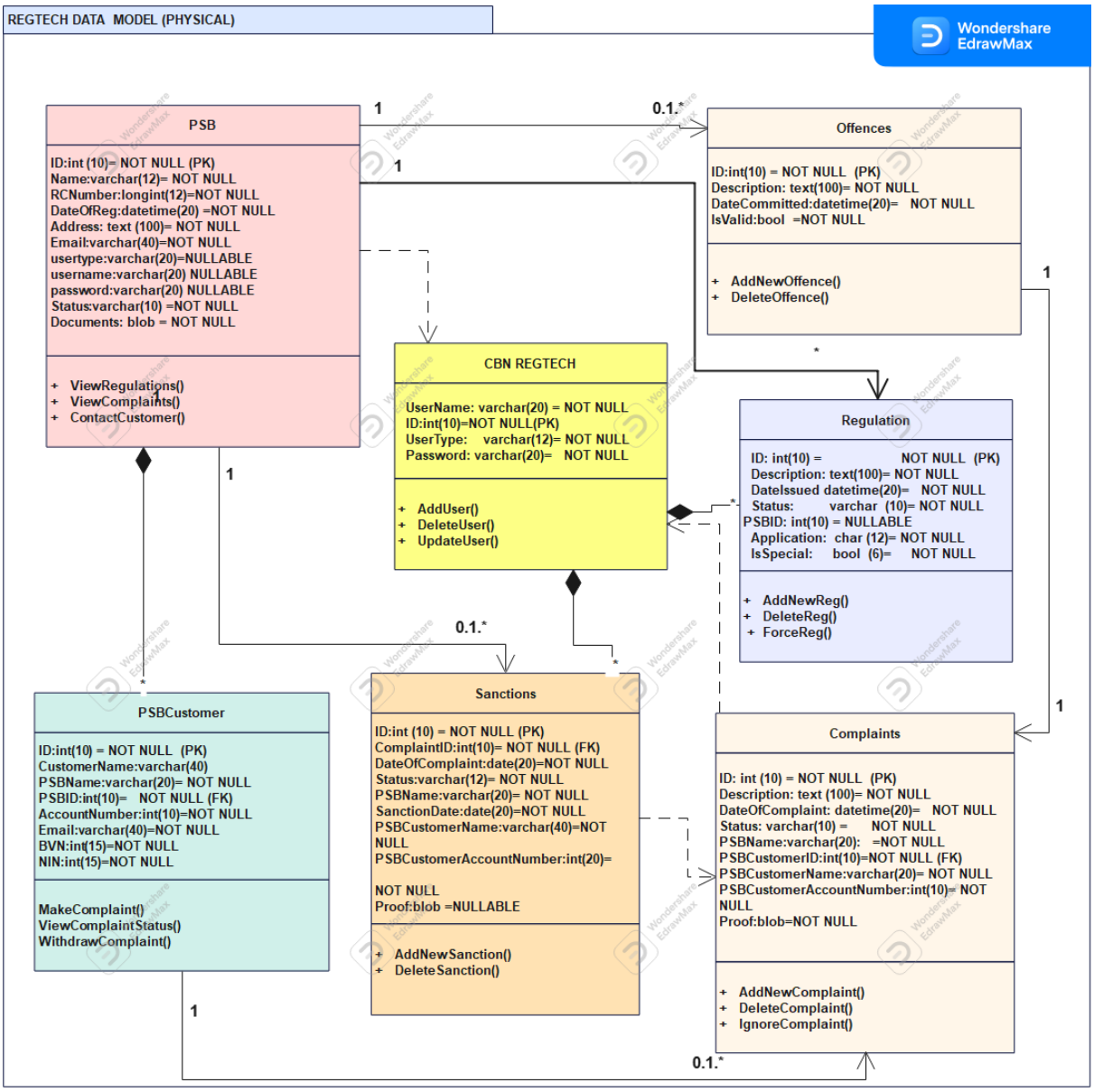

Figure 6: Database Specification (Physical Model) of the New System

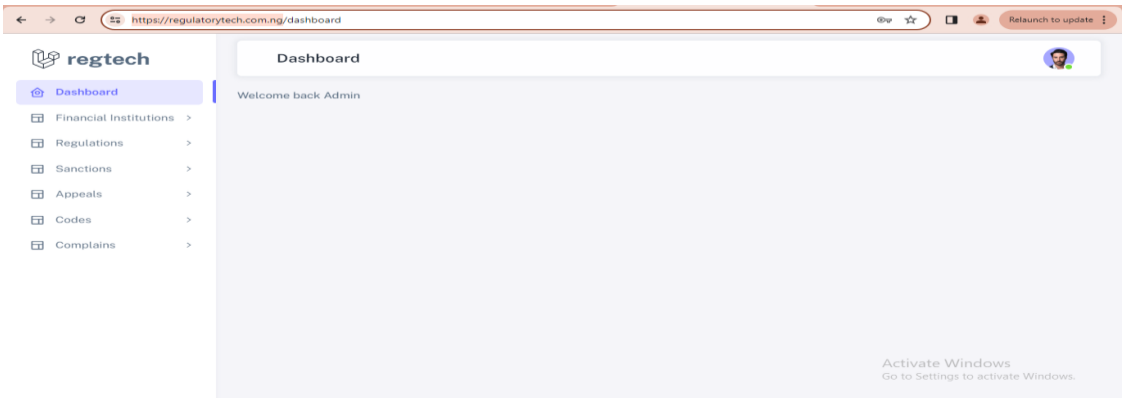

Figure 7**:** Admin page of the REGTECH

5. Conclusion

Implementing a centralized RegTech system requires significant technological infrastructure and investment. Cloud computing, blockchain technology, and advanced data analytics are critical components of such a system. Policymakers must also develop robust regulatory frameworks that support centralization while ensuring transparency, accountability, and data protection. The interplay between technology and policy is crucial for the successful implementation of centralized RegTech. Centralization in RegTech offers significant potential to enhance regulatory compliance and oversight in the fintech sector. The benefits, including enhanced efficiency, improved data accuracy, cost reduction, and better regulatory oversight, are substantial. However, the risks related to data privacy, implementation complexity, systemic failures, resistance to change, and potential stifling of innovation must be carefully managed. Policymakers, regulators, and fintech firms must collaborate to develop centralized RegTech solutions that balance these benefits and risks, ensuring a robust and innovative financial ecosystem.

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