Tutorial SMU Teaching Bank: Enhancing Classroom Learning for Digital Banking and IT Architecture Related Courses

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Abstract:

Singapore Management University (SMU) is possibly the only University in the world that is going to the extent of actually building a fully functioning online digital bank—SMU tBank, for teaching and research purposes. This tutorial will provide a detailed case-study covering the six years implementation journey and evolution of SMU tBank, from an architecture perspective as well as a classroom learning outcomes perspective. The session will describe the curriculum of the Financial Technology track within the BSc (Information Systems) program and include a demo of how the different courses leverage the SMU tBank.

Singapore Management University (SMU) has embarked on a multiyear programme entitled “SMU Teaching Bank for Financial Services Education”, referred to as “SMU Teaching Bank” (or “SMU tBank”). Starting from a clean sheet, SMU is building a fully functioning cloud-based digital banking simulation from the ground up, using today’s architecture best practices. The mission of SMU tBank is to become a world class “teaching bank”, generating an on-going supply of undergrad and postgrad student projects whereby classroom learning outcomes can be put into practice, leveraging industry-leading banking software and enterprise platforms.

SMU has obtained academic licenses for several off-the-shelf banking products and middleware products over the years from leading software vendors, in order to support hands-on labs for both post-grad and undergrad courses. SMU tBank is then assembled leveraging this mix of vendor software into a flexible Service-Oriented Architecture (SOA), and student projects then develop banking applications that invoke reusable services.

The development of SMU tBank involves three levels of higher-education. Post-grad capstone projects specify the solution architecture for banking channels. Undergrad projects deliver banking channel prototypes, based on the solution architecture specified by post-grade capstone projects. Polytechnic (pre-University) students have been engaged through an internship programme to develop components of SMU tBank, which in turn are used to support their own financial technology related diploma courses.

The Enterprise Platform layer of the architecture is key to enabling the on-going flexibility of SMU tBank as it evolves. The components of the Enterprise Platform layer include; an Enterprise Service Bus (ESB), a Business Process Management (BPM) engine, a Payment Services Hub (PSH), a Business Rules Management System (BRMS), Master Data Management (MDM) services, and an Operational Data Store (ODS).

As a benefit of developing SMU tBank channel applications (e.g. Internet/Mobile Banking, Branch Teller, Payments Gateway, Trade Finance, Conversational Banking AI-driven Chat-bot, etc.), as well as developing the underlying enterprise platform components, students gain a deep technical understanding of how a bank works. Besides gaining banking domain knowledge, students benefit from implementing industry best practices in Enterprise Architecture (EA). SMU tBank is used in the classroom as follows:
In retail banking related courses, students use SMU tBank to learn banking processes such as: account opening, credit evaluation, loan repayments, fund transfers, foreign exchange, standing instructions, GIRO, mobile payments, Two-Factor-Authentication, ATM network management, real-time customer specific promotion offers. Lab questions assess the students understanding of both bank processes as well as financial accounting.

In corporate banking related courses, students use SMU tBank financial instruments related to international trade, such as; Letter of Credit, Bill of Exchange, Bill of Lading, Documentary Collection, Trust Receipt, and Export Factoring. Students manage the end-to-end trade process to understand the flow of documents and payments across the relevant parties, e.g.; Importer, Exporter, Freight Forwarder, Issuing Bank, Advising Bank.

In payments related courses, Students use SMU tBank to understand how interbank payments works through an Automated Clearing House (ACH), from different perspectives, a) corporate and retail customers, b) participating banks, and c) central bank. Lab exercises include; payment initiation from corporate customers for both credit transfer and direct debit (GIRO), and bank liquidity management demonstrating scenarios whereby a participating bank has insufficient funds during net settlement with the central bank.

In solution architecture related courses, students use SMU tBank to learn application integration technologies such as message-oriented middleware and web services within an SOA layered architecture. Labs exercises include; developing services which can be assembled to fulfil complex business logic, and drill-down visualizations of what is actually happening in the services layer when a fund transfer is executed, for example. For their term project, students use the SMU tBank API to assemble their own financial services solutions such as a marketplace lending platform.

Anchored around the SMU tBank implementation, and in collaboration with other universities and banks, SMU tBank can be used as a testbed to support practice-based research into a number of areas including; a) In-memory data grid use cases in banking, b) minimising the impact of a core banking system replacement, c) optimizing a bank merger whereby different sets of technology need to coexist, and d) the usage of industry models such as the Banking Industry Architecture Network (BIAN) Service Landscape to inform and optimize the decomposition of banking processes into reusable services.

SMU tBank is deployed onto Amazon Web Services (AWS) and is available for other Universities to use.

Keywords: Teaching Bank, Digital Bank, Service-Oriented Architecture, Enterprise Architecture