



# Building an Islamic financial information system based on policy managements



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**Abstract** For many banks and customers in the Middle East and Islamic world, the availability and the ability to apply Islamic Shariah rules on financial activities is very important. In some cases, business and technical barriers can limit the ability to apply and offer financial services that are implemented according to Shariah rules.

In this paper, we discuss enforcing Shariah rules from information technology viewpoint and show how such rules can be implemented and enforced in a financial establishment. Security authorization standard XACML is extended to consider Shariah rules. In this research XACML architecture, that is used and applied in many tools and system architectures, is used to enforce Shariah rules in the banking sector rather than its original goal of enforcing security rules where policy management systems such as XACML are usually used.

We developed a model based on XACML policy management to show how an Islamic financial information system can be used to make decisions for day to day bank activities. Such a system is required by all Islamic banks around the world. Currently, most Islamic banks use advisory boards to provide opinions on general activities. The gap between those high level general rules and decision for each customer business process is to be filled by Islamic financial information systems.

The flexible design of the architecture can also be effective where rules can be screened and revisited often without the need to restructure the authorization system implemented. Authorization rules described here are not necessarily the perfect reflection of Shariah opinions. They are only shown as a proof of concept and a demonstration of how such rules can be written and implemented.

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## 1. Introduction

According to Islamic Shariah, there are certain rules and regulations that should control financial activities between money lenders and borrowers before making it legal from religious perspectives to prevent Riba (El-Gamal, 2000; Ahmad, 1995). Recently, Islamic banking witnessed huge investments

worldwide (McLean, 2013). Islamic banking is not limited to Islamic countries but spread over other countries such as the United States, Europe and the Far East (Imran et al., 2011). The customers of Islamic banks are not limited to Muslim ones only, they are well-received by non-Muslims as well, see for example Abdullah et al. (2012). This can be referred to the fact that Islamic banking through its various products and services promotes equity (Dhumale and Sapcanin, 1999).

Despite the widespread of Islamic banking and its services, nowadays, Islamic banking is facing several challenges, some of them are technology independent that are related to regulatory issues, awareness and Shariah aspects, see for example Al-Omar and Iqbal (1999), Akhtar and Talreja (2012) and Karbhari et al. (2004). Other challenges are related to how to enforce Shariah rules in the day-to-day banking operations.

As stated in ITS (2011) "One of the greatest challenges in launching an Islamic bank is having access to a well-established independent and active Shariah board. While this process can be rapidly increased by utilizing already existing Shariah boards, it is the implementation of the Shariah board's rulings into the day-to-day running of banking operations, product development and product rollout that serves as the greatest hurdle to Shariah compliant operations and transformation".

Accordingly, one of the main challenges is related to the nature of such rules and how to present them to the banking or financial systems in a proper format. This can be related to the different levels of abstraction between religious codes of conducts and what is permitted or not. A second challenge which is also related to the different religious opinions is particularly related to some transactions and whether they are religiously legal or not and how could such rules be applied to real cases. Those for example can receive conflicting opinions from the different scholars. For more information about Islamic financial products and challenges facing Islamic banking see El-Gamal (2000), McLean (2013), Imran et al. (2011), Siddiqi (2006), Hassan et al. (2013) and Hassan and Lewis (2007).

This research paper is focusing on another dimension (i.e. third challenge) that is related to technical challenges of implementing or enforcing Shariah rules in financial institutes' daily activities. Few research contributions were conducted to take this to technical levels not only from financial perspectives, but also from information technology perspectives. For example, it is important to automate or semi-automate banking systems, with little human intervention to understand Shariah rules, how can these rules be implemented and where should they be applied.

Focusing on the last technical challenge, an information system (proposed) is then expected to handle these three obstacles or challenges to be a good candidate solution.

In this context, this research work proposes using XACML (the Extensible Access Control Markup Language) from OASIS Committee (2013) to enforce Shariah rules in the banking sector. XACML is a standard for access control policy implementation and management.

The remainder of this paper is organized as follows: Section 2 presents briefly the concept of Islamic banking or finance. Section 3 illustrates the XACML language and its architecture. Section 4 presents the related work. Section 5

discusses the use of XACML to enforce Islamic policies. Section 6 presents the conclusion and future work.

## 2. Islamic banking or finance

The general definition of Islamic banking or finance is that the banking or financial system that is abided by Islamic financial rules or rules that are related to monetary issues. For example, Islamic Sharia prohibits what is called "Riba". This is where the money lender has a fixed, inflating or floating amount of money on the money borrower. This is particularly forbidden when money is borrowed and returned. This can be applied to gold or silver where the same type is borrowed and returned. Sharia then prohibits this loan process. Modharaba in Sharia is the process where the money lender is subjected to loss and gain and the process does not always guarantee lender gain in all scenarios. This is then called a risk-sharing rather than risk-free transaction.

Sharia also prohibits money inflation (e.g. accumulative interest rate) where the loan amount increases if the borrower delayed the payment process. The added amount to the loan should be fixed through the whole period.

There have been some trials to generalize Islamic banking in comparison with traditional banking. For example, an article posted in the website (AlBaraka Bank Group) indicated four principles for Islamic banking: Prohibition of Interest or Usury, Ethical Standards, Moral and Social Values, and Liability and Business Risk. Most Islamic banking systems or entities include policy guidelines on how to deal with making sure that transactions are conducted according to Islamic financial rules. See for example, Islamic Financial rules of Dubai Financial Services Authority (DFSA) (The Islamic Finance Rules (IFR), 2013).

Islamic banks in Muslim countries claim to follow Sharia laws and guidelines. However such processes cannot be audited or verified on a daily basis or for each transaction since such processes depend on human domain experts or on those who work as religious advisors for the banks. Hence there is a serious need to build a knowledge management system through which all Sharia rules can be documented, interrogated, evaluated, etc. Our proposed Sharia policy management system can be either part of the Islamic finance knowledge management system or one of its components.

As the first step in the Islamic policy system, we will describe the major general agreed upon financial processes (in the following subsections) that are currently implemented by most Islamic banks. Those high level concepts will be used as parents or even grandparents of the policy management systems. In policy terms, those will be considered as (Policy\_Sets) where many policies can be generated as children of those that we will call for now policies. Names and details of the following Islamic financial activities are taken from a wide range of Islamic resources through the Internet, see for example Islamic Development Bank and Institute of Islamic Banking and Insurance, where the first website is for the Islamic development bank that is established from many countries to sponsor Islamic banking and finance in general and the second website is for a non-profit organization established in UK with the general goal of establishing an Islamic banking system. The

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