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Bank of England Suffers Major Outage

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On Monday, October 20, 2014, the Bank of England, the U.K.'s central bank established in 1694, suffered a serious outage that affected the online transfer of funds for most of the day and the closing on home purchases for over a day. This outage was a particularly embarrassing incident for the bank, which only recently had warned U.K. banks that they were susceptible to failures because of their use of legacy systems developed in the last century.

The Bank of England Outage

After a weekend of scheduled maintenance, the Bank's CHAPS (Clearing House Automated Payments System) failed to come up on the following Monday. CHAPS provides real-time, online transfer of large funds between banks and other financial institutions such as mortgage lenders. It is used by over 5,000 financial institutions.

The BoE issued a terse statement saying only that ""The Bank of England has identified a technical issue related to some routine maintenance of the RTGS system." The RTGS (Real Time Gross Settlement) system underpins the large-value CHAPS payments. The system remained unusable until late afternoon that Monday.

There were several problems that contributed to the outage. RTGS had a backup system, but IT personnel decided not to try a failover because the backup system was relatively untested. They opted instead to try to correct the RTGS problem, an effort that took much longer than expected.

To compound the problem, several BoE top executives failed to get the initial email concerning the outage because they were in Europe at a business meeting. It took over an hour to get the attention of a Bank Deputy Governor to alert him to the problem.

While the CHAPS system was down, the BoE attempted to complete fund transfers manually, but fell woefully behind. When the CHAPS system finally came online, the BoE extended its closing hours from 4 PM to 8 PM to complete online funds transfers. BoE personnel were able to complete all 143,000 funds transfers for the day totaling nearly £300 billion. However, almost a third of transfers for house purchases could not be completed; and many house purchases were delayed for a day or more due to the outage.

The Deloitte Report

BoE faced government pressure due to the lack of transparency during the outage (the Bank only noted that there was a technical issue with the RTGS system and provided no updates on the efforts to restore service). The British government demanded that BoE obtain an independent report of the outage. The review would investigate the causes of the incident, the effectiveness of the Bank's response, and provide lessons learned from the incident.

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BoE chose Deloitte, one of the big-four accounting firms, to launch the investigation into the system outage. The report looked in depth as to what caused the fault and to evaluate the robustness and governance of the system. It determined how well the Bank had reacted to the downtime and whether the backup plans and incident management were effective in solving the issues.

The report showed that the central bank was not fully equipped to handle crises affecting Britain's banks. It said that in the absence of robust crisis management arrangements within the Bank, there were insufficient resources in place to coordinate and communicate response activities. It noted that early invocation of the backup system on the day could have helped mitigate the immediate impact on the economy. The report went on to say that the central bank should acknowledge that in certain circumstances, the Bank itself may be the cause of a wider financial services crisis.

In response to the report, BoE said that it would strengthen its crisis-management procedures.

Banks' Dependency on Legacy Systems

In large part, established banks are built on mainframe systems that date back to the 1960s and 1970s. It is difficult for the banks to modify or replace these core legacy systems because of their complexity and the shortage of the necessary in-house IT skills. These systems are difficult to maintain since the developers have long since retired or died. Furthermore, the systems tend to be written in COBOL and PL1; and qualified programmers in these languages are becoming few and far between.

Rather, banks are providing new services such as online banking and mobile banking by developing custom systems for these services and linking them to the core mainframe systems. Banks are investing in small IT projects than can provide a quick return on investment rather than making huge investments in replacing legacy core systems for long-term benefits.

As a result, there have been some major failures of banking systems.[1]

Royal Bank of Scotland

The granddaddy of all outages hit the Royal Bank of Scotland (RBS) in June of 2012. It caused weeks of havoc. The outage was caused by an upgrade gone massively wrong. The bank had decided to upgrade its batch facility to a new version. It found a problem with the new version and backed it out, returning to its current version. However, in the process, the IT staff accidentally deleted a key control file, the loss of which prevented the overnight batch job from completing.

It took a week to pinpoint the cause of failure and to resume the batch run. However, during this time, scheduled bills could not be paid, employers could not pay their employees, and pensioners could not get their pension payments. Interbank transfers could not be made, which spread the problem to other banks.

It took more than two additional weeks to work through the backlog of transactions that had accumulated during the outage and to resolve all of the problems so that the systems could be returned to normal operations.

RBS was hit with a fine of £56 million for the outage, the biggest U.K. retail fine in history.

The Lloyds Banking Group Outage

On the afternoon of January 26, 2014, customers of the banks comprising Lloyds Banking Group could not use their debit cards nor could they withdraw money from ATMs. The Lloyds Banking Group banks include Lloyds, TSB, and Halifax. Hundreds of thousands of customers were left at checkout counters or

[1] Banks Worldwide Suffer from IT Legacy, *Availability Digest*; February 2014. http://www.availabilitydigest.com/public_articles/0902/bank_outages.pdf

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gas stations unable to pay for their purchases. The outage lasted from 3 PM to 7:30 PM. Once service was restored, there were additional delays as the backlog of transactions was cleared.

According to sources, there was no maintenance or update activity going on at the time of the failure. Rather, the failure was caused by two of seven servers that process debit-card transactions. Conjecture is that one of the servers was a production server and the other was its backup. It appears that the bank lost a server and then suffered a failover fault.

Australia's Painful Banking Outages

There have been a series of major outages at Australia's four largest banks.[2] The National Australia Bank (NAB), Commonwealth Bank, the Australia and New Zealand Bank (ANZ), and Westpac have all had their shares of outages affecting ATMs, retailers' POS devices, and online banking. The outages have occurred as these historic banks engage in multi-year replacements of their aging core legacy systems, some dating back to the 1980s. Apparently, these systems have become quite fragile in their old age.

U.S. Banks

Bank of America

In February, 2013, customers of Bank of America were unable to access their online banking accounts, mobile payments systems, or even the bank's telephone call centers. Even Bank of America's employees were not able to see customer accounts for several hours. The bank attributed the outage to "internal technical problems."

J.P. Morgan Chase

Millions of JPMC customers lost access to their online accounts for more than a day in September, 2010, due to a website server failure. It was reported that the problem was a software bug. It took most of the day for the bank to find and fix the problem.

China

In just one weekend in June, 2013, three Chinese banks suffered outages.

- A money transfer system at the Bank of China failed, and customers could not transfer money.
- Customers of Bank of Nanjing could not transfer money.
- A nationwide outage of ATMs and POS devices occurred at China' biggest bank, the Industrial and Commercial Bank of China.

All three banks said that the outages were due to technical problems.

[2] Australia's Painful Banking Outages, *Availability Digest*; March 2012.
http://www.availabilitydigest.com/public_articles/0703/australian_bank_outages.pdf
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There Is Some Progress

However, there has been some progress by banks to move to new systems. The Nationwide Building Society in the U.K., after years of underinvestment, embarked in 2008 on a £1 billion project to upgrade its data center. It has now successfully completed its legacy system overhaul.

The cloud is also being used for new services. Barclay's Bank is using cloud computing to create new services such as a mobile payments app. The application sits in a private cloud and doesn't use the web site that sits on top of the bank's core IT infrastructure.

The Embarrassment for BoE

This outage was particularly embarrassing for BoE because it had been warning U.K. banks to guard against technical failures that could lead to financial instability. Back in January, 2014, a senior BoE official had said that the U.K. banking systems were "a long way from being robust." When the BoE outage hit, one of the common criticisms was its earlier remarks about the robustness of other banks.

The BoE has now acknowledged that it, too, could be the cause of a wider financial crisis and that it would strengthen its crisis-management capabilities.

Summary

The reluctance for banks to replace legacy core systems makes problems inevitable. Most U.K. banks (as well as banks around the world) still use legacy systems built in the last century that continue to work. Their reluctance to change these systems has led to several major banking outages. Most banks are adding middleware front-end systems to their core systems rather than replacing the core.

The BoE appears to not be an exception to this observation. As a result of the Deloitte report, BoE has said that it would strengthen its crisis management procedures. Hopefully, this includes the periodic testing of its backup systems to avoid failover faults.

Acknowledgements

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