Going Bach into History

Historical Research on Composer Supported with Innovative Applications Developed in VisualWorks® with Seaside

Bach-Gesellschaft

Georg Heeg, a consultant who works on Smalltalk projects throughout central Europe, tells a story about a unique and interesting use of Cincom VisualWorks integrated with Seaside and GemStone – two Smalltalk technologies that work well with VisualWorks. The goal of the project was to determine the house in which composer Johann Sebastian Bach had lived during his time in Cöthen, Germany. Heeg – a Cöthen resident – found several innovative uses of VisualWorks as part of the effort to discover which house it was.

Bach, whose celebrated work during the Baroque era includes "The Toccata and Fugue in D Minor" and the Brandenburg concertos, lived in Cöthen from 1717 until 1723, where Prince Leopold of Anhalt-Cöthen hired him to serve as Kapellmeister, the director of music for chapel. The town of Cöthen was interested in finding out where Bach had lived, to promote locations related to one of the town's most famous residents in support of tourism. The problem was that no one knew exactly where Bach had lived.

Bach-Gesellschaft, a Bach society, initiated a project to find out everything they could about Bach's life when he lived in Cöthen. More specifically, the project, which was funded by the European Commission and the State of Saxony, was charged with locating the house in which Bach lived at that time.

Realizing that this study would not only require research but also some sophisticated technology, the project leaders hired Georg Heeg to use whatever applications were necessary to support the research.

Goals: To find the house of Johann Sebastian Bach in Cöthen, Germany.

Challenges:

- Massive amounts of data to analyze
- Complex research could not be analyzed using inflexible traditional computing approaches
- Two-year time limitation required speed and innovation
- All previous methods have been unsuccessful

Solution: Cincom VisualWorks provided flexibility for the research team to develop innovative applications with the use of Seaside and GemStone.

Results:

- Successful deployment of turnkey systems with Linux
- Rapid prototyping of new sorting and selection algorithms
- Better and faster product performance
- Expansion to new markets with adapted systems

Georg Heeg

"The standard method would be to search a document with an address," Heeg explains, "but that would not work in this case. All the archives have been searched through, over and over, from 1880 to now by many people. A piece of paper with Bach's address doesn't exist. However, we thought computers could help. We could input a variety of data into a computer and run algorithms to find specific information."

Heeg's primary approach was exclusion. His plan was to look at all the houses and determine where Bach could not have lived. According to Heeg, one of the remaining houses must be where Bach lived. Heeg points out that this methodology, while common in fields such as mathematics and law enforcement, is rarely used by historical researchers. In other words, Heeg had embarked on an innovative and unique approach to historical research.

Heeg's strategy was to first search all available historical data on Bach and the other residents of Cöthen. His team would input all the data into a computer model, and then evaluate this information to exclude houses from the list. One of the most interesting sets of documents discovered by the team was the town's tax records.

These records allowed the team to identify house owners throughout history, although Bach was not on the list since he rented a house. In addition, the tax records provided an ongoing list of several other factors including the amount of money paid as tax on each house, the size of the house and the order of the houses on the list.

Finding the Right Location with VisualWorks

The ultimate challenge for Heeg was to correlate houses on the list with structures in modern-day Cöthen. During Bach's time, the town had no addresses. In 1819, during the Napoleonic period, a house numbering system was applied, and a half century later the current method was established, using a street and address. Luckily, both the structure of the city and the order of the houses on the tax records remained consistent through successive address changes, enabling the researchers to trace the history of current addresses all the way back to a time prior to addresses via a series of maps.

"We could not do this by hand, so we collected the data in Excel spreadsheets, and used VisualWorks and Seaside to develop applications to help us evaluate the data," Heeg notes.

VisualWorks COM Connect was used to interface with Microsoft Word and Excel to extract the data. The team imported the data from the Excel spreadsheets into VisualWorks, creating objects for houses, owners, dates of ownership, dates of construction, renters, taxes and the position of a house on the tax records.

Smalltalk was used as the application-development and delivery platform. The team utilized VisualWorks to model the data, to answer continuously changing questions about Bach and the town, to narrow down the list of potential houses.

"VisualWorks was the tool of choice to collect and retrieve the data."

In addition to VisualWorks, the team used GemStone as the data repository and Seaside as the presentation mechanism, allowing the researchers to access the data via the Web. Both Seaside and GemStone were chosen because they easily integrate with and work well with VisualWorks.

"VisualWorks was the tool of choice to collect and retrieve the data," Heeg says. "We had an entire overview in the GemStone database, so a researcher could see all the information that anyone has written about any house, all on the same page."

House size was a critical element in the research. The team was usually able to deduce the size of each house from the tax amounts – the larger the house, the higher the tax – unless the house was tax exempt. The house that Bach lived in had to be large enough for the chapel orchestra to practice, as well as to house Bach's large family and massive amount of furniture and other possessions. The team estimated that the minimum size of a room required for practice would be 500 square feet. Checking against the records for any house that would be large enough to hold a room this size, the team was able to eliminate many of the houses in town, which were not large enough, at about 500-900 square feet for the entire house.

Date of construction was also an important factor that eliminated many houses. Any house that had not been built before 1723 was removed from the list of potential houses.

In addition, the number of renters would take a house off the list of potential candidates. Several larger houses were found to have a larger number of renters, which would not have been conducive to Bach's situation, especially with the chapel orchestra rehearsing in the house on a regular basis.

In the end, only two potential houses remained, and both houses were owned by the same landlord. The team determined that Bach lived in both houses. The first building where Bach lived was torn down 50 years ago, and a pharmacy now stands in its place. The second building is still standing, ironically two doors down from Georg Heeg's home. The Bach-Gesellschaft is currently deciding how to designate the remaining house as a landmark and otherwise leverage the information to support tourism.

How did VisualWorks and Seaside help?

"VisualWorks and Seaside were the key to project success," Heeg states. "We were able to model our ideas, questions and findings in VisualWorks and visualize them in Seaside."

"Without VisualWorks, the project would not have been possible," he continues. "With only two years to complete the project, time was very limited and we were always searching for new information and exploring new possibilities. We constantly needed immediate feedback. The feedback time is so critical for these types of exploratory projects."

Heeg explains that traditional computer languages – C, FORTRAN and COBOL, as well as Java and .NET – would not be feasible, because the turnaround time would take so long.

"Without VisualWorks, the project would not have been possible ... I am very confident that we wouldn't have been able to do it with any other approach ..."

"Other dynamic systems lack the closed mapping, however," Heeg says. "They slow you down and take away the flexibility. VisualWorks outperforms other dynamic languages because it is simpler, more powerful, more general and more approachable."

"I am very confident that we wouldn't have been able to do it with any other approach," he adds.

VisualWorks is the preferred solution, according to Heeg, because Smalltalk does not process information like a computer, but rather reflects how people think and therefore affords greater flexibility, especially when trying to determine an unknown solution. Heeg and the team used VisualWorks to develop complex algorithms to search the details that were needed to finally determine the houses Bach had lived in.

"VisualWorks enabled us to build models on the fly in an agile way," Heeg states. "Whenever one of the researchers came up with a new question, we could easily develop a model within VisualWorks to answer the question."

Hans Georg Schäfer, General Manager of Köthener BachGesellschaft mbH and Director of Köthener Bach-Festtage, couldn't be happier. "For the city of Cöthen and for our organization, it is very important to know as much as possible about Bach's work and life in Cöthen. For more then 125 years, historians have searched for the home of the most important baroque composer where he lived, created his immortal music and worked with his musicians. So we knew that standard historical research would not lead us to more information. Thus, we decided to use computer technology to expand the research. We, the BachGesellschaft and I, personally, are very happy that our idea turned out to be successful and that the home – actually, the two homes – were found."

About Heeg

Georg Heeg eK provides services that simplify complex business processes. Heeg's consultants use Smalltalk to model areas of business to control manufacturing, logistics, financial transactions or any other domain.

For over 25 years, Heeg has serviced many clients in many industries. Heeg also provides Smalltalk training. For more information about Heeg's services, contact Heeg at +49-231-975990, send an e-mail to info@heeg.de or visit the company's website at www.heeg.de.

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