

```

1. point.Snapshot;
2. Dim srv As PISDK.Server
3. Fore*%^(%) (point in server.PIPoints)?!!??
4. Dim srv A PISDK.Server
5. if (time_to_market > expected)
{
    solution = vCampus;}
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{
    solution = vCampus;}
6. if (time_to_market > expected)

```

"where PI geeks meet"

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V CAMPUS

2009

LIVE!

Palace Hotel, San Francisco, CA ▪ Dec. 1-2, 2009

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Extreme Code Review: LinqToPI

Michael van der Veeken, Atos Origin

Bodo Bachmann, OSIsoft

Steve Pilon, OSIsoft

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Agenda

- OLE DB, PI OLEDB and LINQ
- Atos Origin's LinqToPI
- Discussion

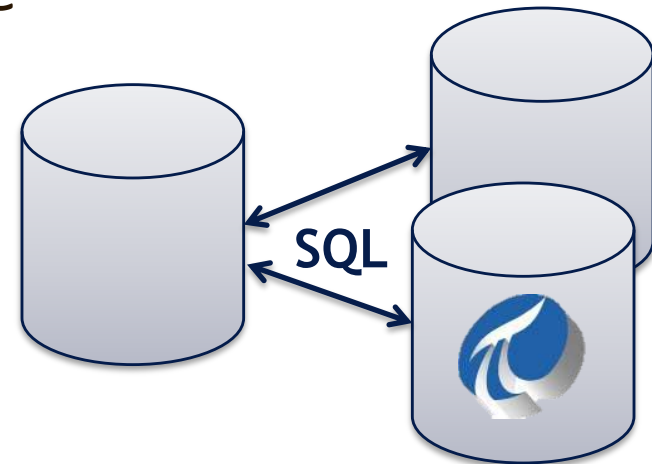
The screenshot shows a Windows calendar application window titled "Calendar". The date is set to December 1, 2009, and the day of the week is Tuesday. The calendar view shows the month of December, with the 20th highlighted. Below the calendar, the agenda for the 20th is displayed. The events are:

- OSIsoft vCampus Live! (Palace ...)**
- Considerations of the New P...**
18:00-18:45 (Ralston Ballroom)
- Programming through JDBC ...**
18:00-18:45 (Grand Ballroom)
- Break**
19:00-19:30 (Gold Ballroom)
- Extreme Code Review (3rd P...**
19:30-20:30 (Grand Ballroom)
- PI Asset Subsystem: MDB to...**
19:30-20:30 (Ralston Ballroom)

The bottom of the window has a navigation bar with "Day", "Menu", and "Menu" buttons.

OLE DB and PI OLEDB

- OLE DB
 - COM-based API designed by Microsoft
 - Accessing various data sources in a uniform manner
- PI OLEDB
 - Exposes PI as a relational database
 - Now in beta: PI OLEDB for AF



LINQ

- Language Integrated Query
 - .NET Framework Component
 - .NET Language Extensions
- Allows querying data sources with in-code, SQL-like queries
- LINQ Providers
 - Standard (e.g. SQL, XML)
 - Custom

LinqToPI

- Custom LINQ Provider developed by Atos Origin
- Empowers .NET developers to query PI using in-code, SQL-like queries

```
var values =  
    from  
        arc  
    in  
        context.Archive.ArchiveData  
    where  
        arc.Tag == tagname &&  
        arc.Time.Between(startTime, endTime)  
    select arc;
```

LinqToPI Introduction



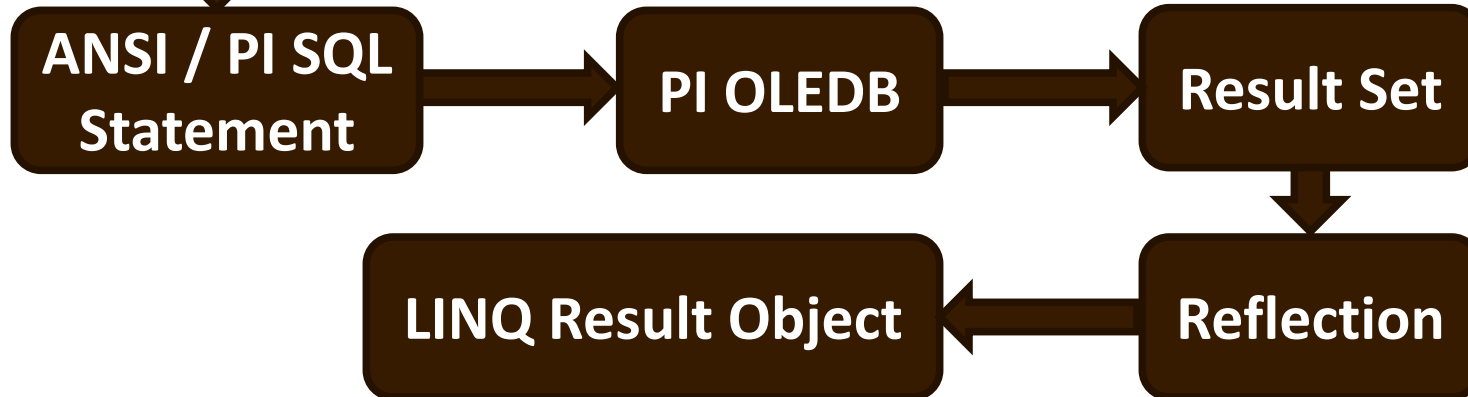
Some Facts About LingToPI

- Basic LINQ Provider for PI
 - Using PI OLEDB Provider
- Prototype / Proof of Concept
- Build using the Microsoft IQ Toolkit
 - <http://www.codeplex.com/IQToolkit>
- Lot of work to be done implementing more PI specific commands!

General Overview

```
PiServerContext context = new PiServerContext("myPIServer", System.Console.Out);  
  
var ret = from  
    arc  
    in  
        context.Archive.ArchiveData  
    where  
        arc.Tag == tagname &&  
        arc.Time.Between(startTime, endTime)  
    select arc;
```

```
context.Archive.ArchiveData.Select(  
    v => v.Tag == tagname && v.Time.Between(startTime, endTime));
```



Discussion Point



PI OLEDB or PI SDK

- Pro's and Con's
- Level of work
- Serialization
- WCF compatibility
- PI OLEDB optimization

Discussion Point



PI OLEDB Optimization

- Bulk writing to PI with the NO FLUSH option
- Parallel, asynchronous PI SDK calls

Discussion Point



Connection String

- SSPI (Integrated Security)
- Multiple Sessions

Discussion Point



Variant columns

- String rather than double

Discussion Point



Missing _index column

Discussion Point



PI Timestamps
(relative time)

Discussion Point



Dynamic typing in .NET 4

Conclusion – PI OLEDDB

- PI $\neq$ Relational Database
- PI SQL Queries are more complex
- When in doubt, post your questions on the OSIsoft vCampus forums ;)

The screenshot shows the OSIsoft vCampus website interface. At the top, the navigation bar includes links for Library, Discussion Hall (selected), Auditorium, Bloggers' Place, Training Center, Download Center, and Control Panel. Below the navigation bar, the main content area is titled 'DISCUSSION HALL' and 'GENERIC FORUMS'. It displays a table of forum threads with columns for 'Latest post', 'Threads', and 'Posts'. The threads listed are 'Generic vCampus Discussions', 'General .NET Development', 'PI System Integration', and 'Training & Online Courses'. On the right side, there are sections for 'RSS FEED', 'SHORTCUTS' (including links to view all users, posts not read, forum subscriptions, who is online, moderate forums, and forum administration), and a 'TAG CLOUD'. At the bottom right, there is a link to '.NET ProcessBook Add-Ins'.

	Latest post	Threads	Posts
Generic vCampus Discussions This forum is for generic discussions about the Virtual Campus, typically not programming-related.	Re: Can and should... by Daniel Takara Fri, Nov 27 2009 4:20 AM	46	201
General .NET Development This forum is for any generic .NET development question, not necessarily related to PI.	Re: What can replace... by Jon Croonenberghs Thu, Nov 19 2009 10:47 AM	21	101
PI System Integration This forum is for questions on integration of the PI System with other systems - not necessarily programming-related.	Re: Integration... by Daniel Takara Wed, Nov 25 2009 8:42 PM	46	256
Training & Online Courses This forum is dedicated to non-technical discussions around the Online Courses - or CBTs, Computer-Based Training, provided on vCampus.	Re: webinar by Mohammad Mon, Nov 23 2009 7:22 AM	8	25

Conclusion – LinqToPI

- Enables user-friendly, intuitive, in-code querying
 - SQL-like & IntelliSense
- Rapid development for WCF & Silverlight
- Work in progress – share, collaborate

Thanks Michael!

michael.vanderveeken@atosorigin.com

www.atosorigin.com



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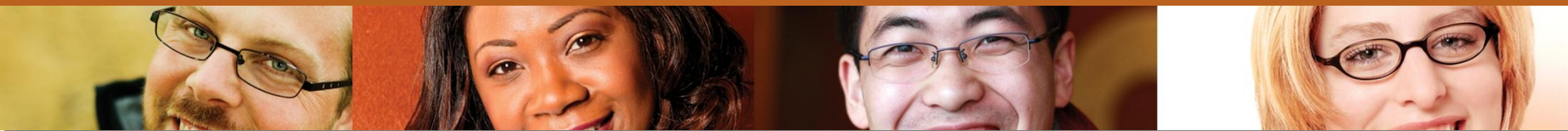
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THANK YOU.



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