

# UnRiskFACTORY

Powered by

gridMATHMATICA™

*Sascha Kratky*  
*uni software plus GmbH*  
*MathConsult GmbH*  
*Austria*  
[www.unrisk.com](http://www.unrisk.com)

# Outline of the talk

- UnRisk PRICING ENGINE
- UnRisk FACTORY
- gridMathematica experiences

# UnRisk

## PRICING ENGINE

- Mathematica package for valuation of financial derivatives
- Introduced in February 2001
- Optimized numerical engine implemented in C++
- ~100 financial instrument types
- Market data and models

# Mathematica Notebook Front End

The screenshot shows the Mathematica Notebook Front End interface. The notebook title is "FixedRateBond.nb". The interface includes a menu bar with "Input", "Style", "Alignment", "Fonts", "Print", and "Help". The notebook content consists of several code cells:

```
Needs["UnRisk`UnRiskFrontEnd`"]
```

▼ **UnRiskVersion[]**  
You are using version 2.5. of the  
UnRisk PRICING ENGINE for Mathematica.

▼ **MyBondCaseA = MakeFixedRateBond[0.04, {2002, 10, 10},  
{2000, 4, 10}, CouponBasis → "BondBasis",  
CouponFrequency → "Semi-Annual", FaceAmount → 1000,  
RedemptionRate → 0.95]**  
---Fixed Rate Bond---

▼ **MySwapCurve = MakeSwapCurve[{2000, 8, 2},  
{{1, 0.05}, {7, 0.0502}, {31, 0.052}, {92, 0.0532},  
{183, 0.055}, {365, 0.0572}, {730, 0.061}}]**  
---Swap Curve---

▼ **MyYieldCurve = MakeYieldCurve[MySwapCurve]**  
---Yield Curve---

▼ **MyVall = Valuate[MyBondCaseA, {2000, 8, 2}, {2000, 8, 7},  
MyYieldCurve, ReturnValues → {CleanValue, DirtyValue}]**  
{915.404, 928.409}

The bottom status bar shows a zoom level of 100%.

# Excel Front End

Microsoft Excel - CPFixedRateBonds.xls

Datei Bearbeiten Ansicht Einfügen Format Extras Daten Fenster Mathematica ?

Q30 =

	W	X	Y	Z	AA	AB	AC
1	Deterministic Drift	Reversion Speed	HW Volatility	Holiday Calendar	Dirty Bond Value	Clean Bond Value	Option Value
2	drift	speed	volatility	N	102.013134	100.051281	-0.2682
3	drift	speed	volatility	N	101.447119	99.469342	1.4670
4	drift	speed	volatility	N	100.202264	98.202264	-0.3665
5	drift	speed	volatility	N	99.184859	97.212257	3.9433
6	drift	speed	volatility	N	102.014009	100.041406	-0.2675
7	drift	speed	volatility	N	101.446539	99.468517	1.4670
8	drift	speed	volatility	N	99.940954	97.963176	-0.3345
9	drift	speed	volatility	N	99.483336	97.483336	3.8071
10	drift	speed	volatility	N	102.024292	100.051689	-0.2682
11	drift	speed	volatility	N	101.446859	99.474257	1.4681
12	drift	speed	volatility	N	99.940145	97.978292	-0.3345
13	drift	speed	volatility	N	99.166428	97.188651	3.9506
14	drift	speed	volatility	N	102.181887	100.181887	-0.2875
15	drift	speed	volatility	N	101.457264	99.484661	1.4672
16	drift	speed	volatility	N	99.941020	97.968417	-0.3347
17	drift	speed	volatility	N	99.148582	97.170560	3.9662
18	drift	speed	volatility	N	102.013942	100.036165	-0.2682
19	drift	speed	volatility	N	101.665300	99.665300	1.4046
20	drift	speed	volatility	N	99.951303	97.978700	-0.3345
21	drift	speed	volatility	N	99.167373	97.194770	3.9507
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							

SwapCurves / Bootstrapping / BootstrapInfo / CapData / SwaptionData / Calibration / CalibrationInfo / Schedules / Valuation / ValuationInfo

Bereit Berechnen

# Excel Front End Pros and Cons

- Excel popular among target group
- Integration with market data providers
- Workbooks are fragile in the long run
- Data safety concerns
- Excel 2007 can't do math

$$850 * 77.1 = 100,000$$

# UnRisk FACTORY

1. Web-based front end
2. Database
3. UnRisk Adapter imports market data via plug-in mechanism
4. UnRisk Service performs computations with gridMathematica and UnRisk PRICING ENGINE

# UnRiskFACTORY

when real-time derivatives analytics counts

- valuation
- instruments
- market data
- scenarios
- admin

- overview
- setup
  - equity basket kinds
- search instruments
- ir types
  - digital range accrual
  - fixed rate bond
  - general cm floater
  - quanto spread
  - snowball floater
  - steepener
- equity types
  - equities
  - equity baskets
  - equity derivatives
- external instruments
- instrument groups
- instrument events
  - pending
  - approved

## INSTRUMENTS

### Setup

- [Equity Basket Kinds](#)
- [Search Instruments](#)

### Browse IR Types

- |  |   |
|--|---|
| <a href="#">Digital Range Accruals</a>     | <a href="#">Quanto Spreads</a>              |
| <a href="#">Fixed Rate Bonds</a>           | <a href="#">Ratchet Floaters</a>            |
| <a href="#">General CM Floaters</a>        | <a href="#">Snowball Floaters</a>           |
| <a href="#">General CM Floaters Type 2</a> | <a href="#">Start/End Volatility Bonds</a>  |
| <a href="#">Interest Rate Swaps</a>        | <a href="#">Steepeners</a>                  |
| <a href="#">Max/Min Volatility Bonds</a>   | <a href="#">Steepeners Type 2</a>           |
| <a href="#">Multitranches Zeros</a>        | <a href="#">Switchable Fixed Rate Zeros</a> |

### Browse Other Types

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| <a href="#">Equities</a>           | <a href="#">External Instruments</a> |
| <a href="#">Equity Baskets</a>     | <a href="#">Instrument Groups</a>    |
| <a href="#">Equity Derivatives</a> |                                      |

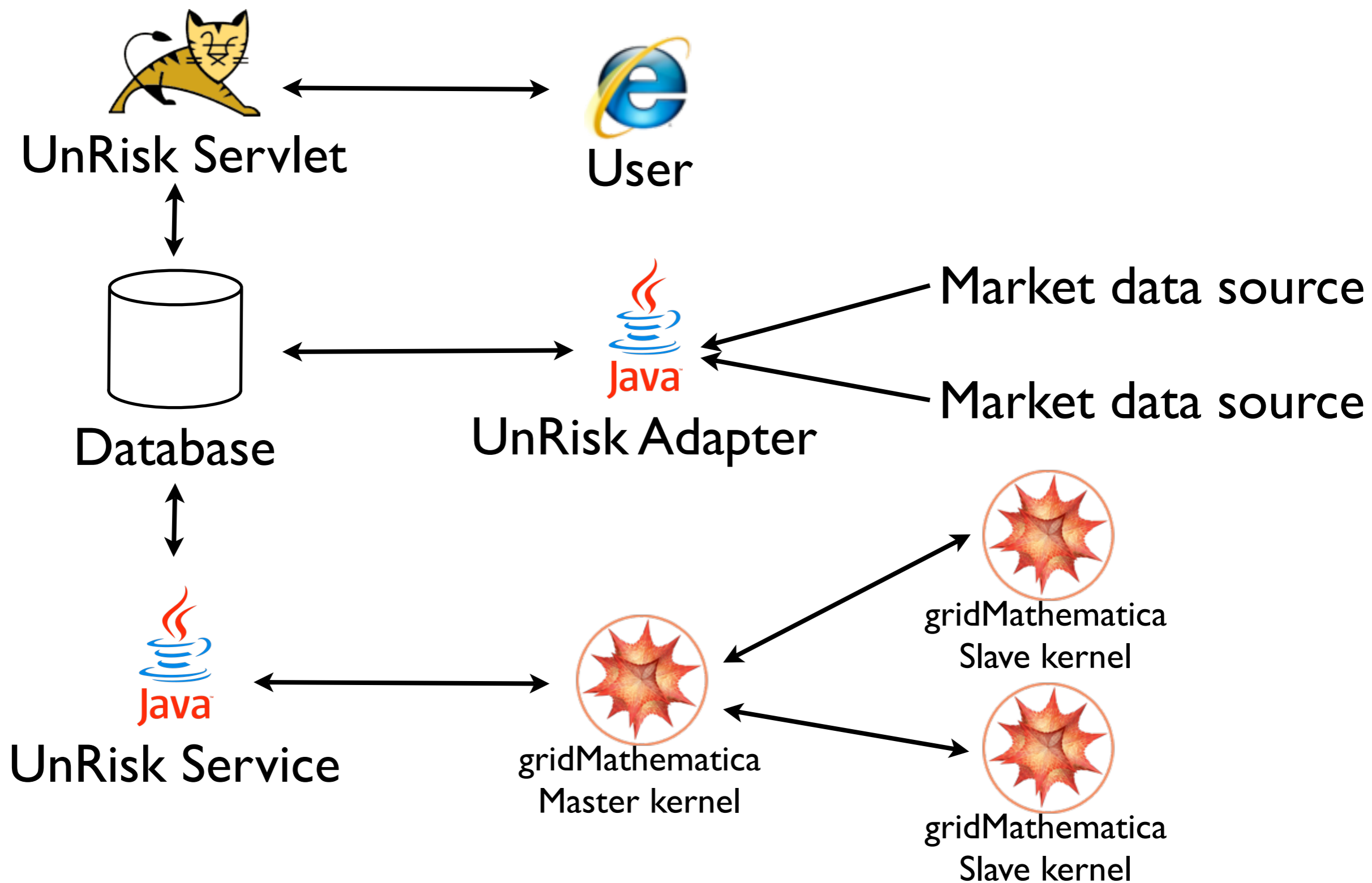
### Browse Instrument Events

- [Pending Events](#)
- [Approved Events](#)





# UnRisk FACTORY

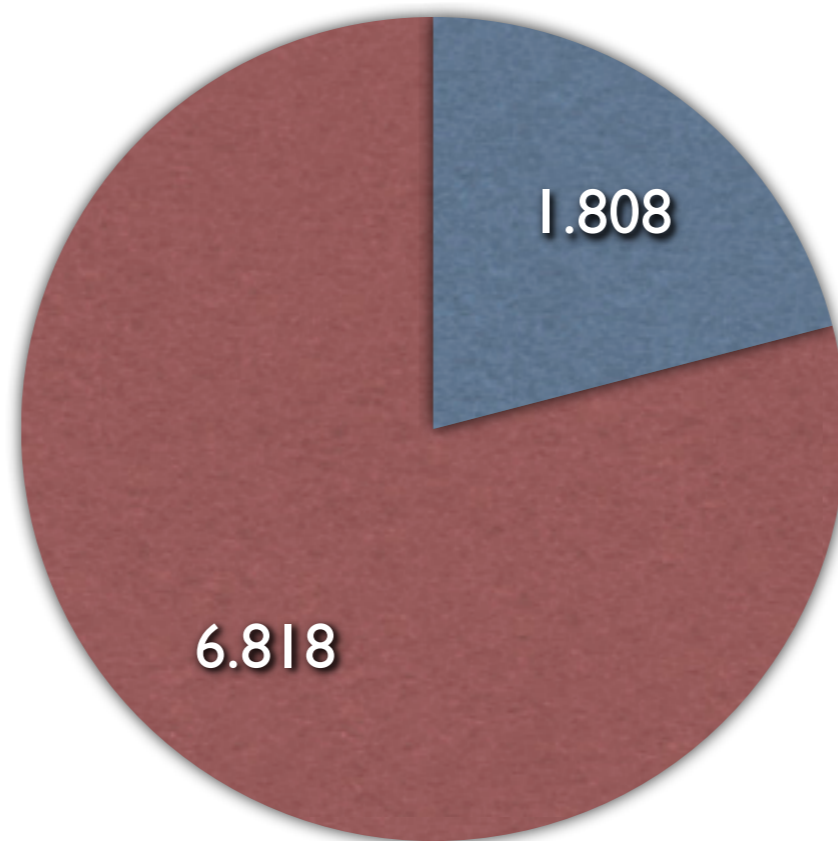


# Environment

- 5 Dell blade servers (4 core Intel Xeon)
- Microsoft Windows Server 2003
- Microsoft SQL Server 2005
- Tomcat 5.5 servlet container
- gridMathematica with 16 slave kernels

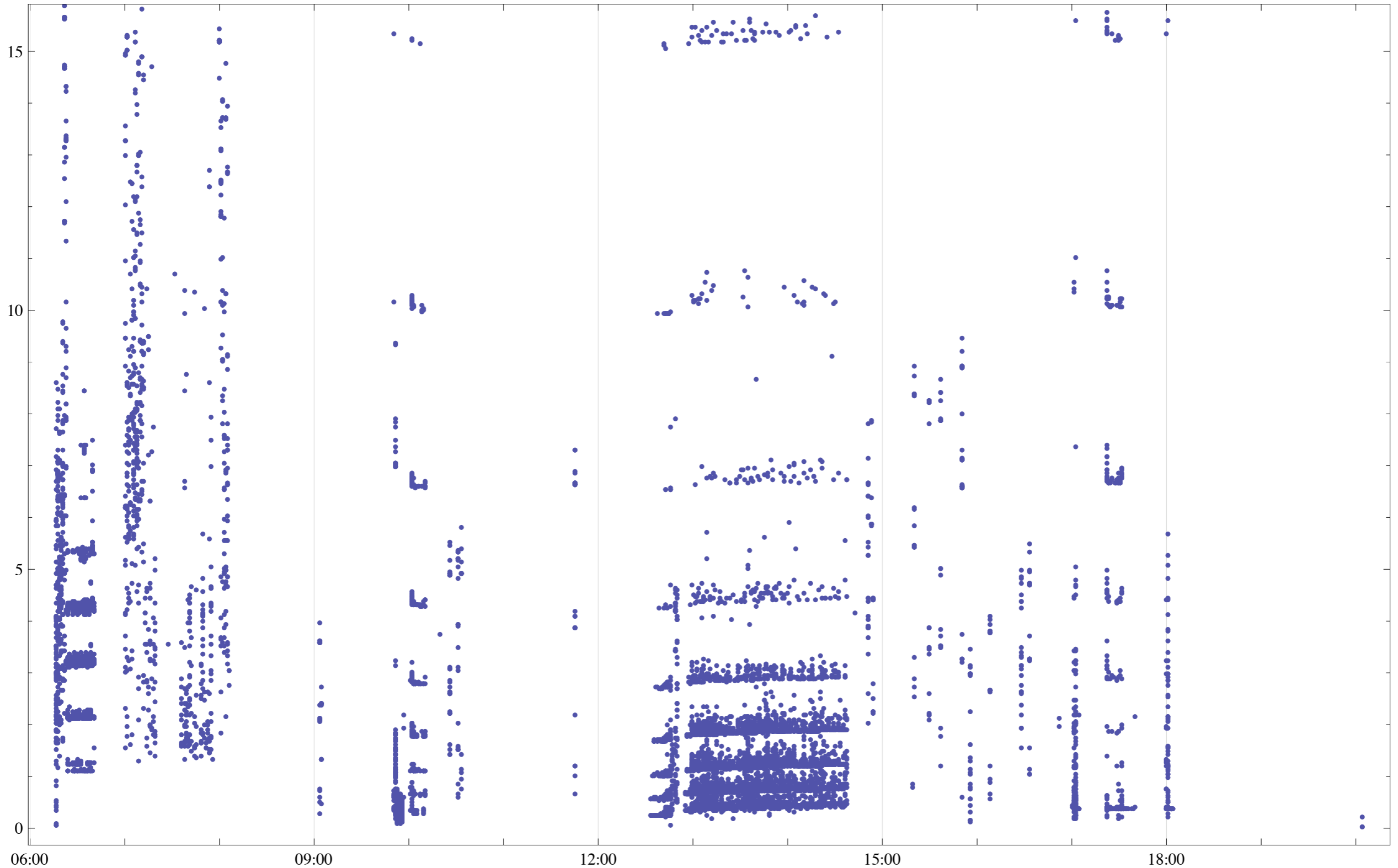
# Daily Workload

Number of computations



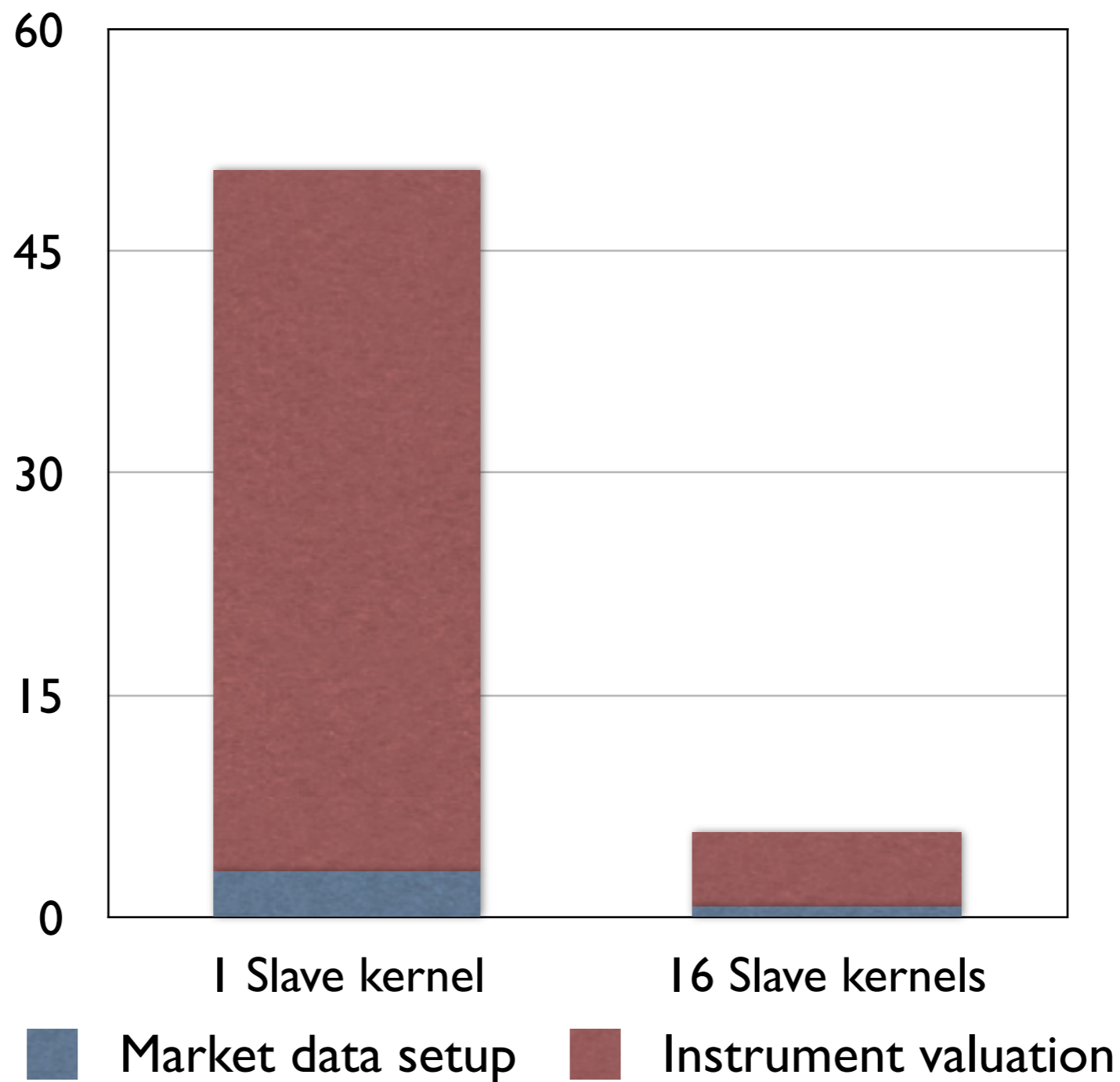
- Market data setup
- Instrument valuation

# Computation Time / Duration



# Grid Efficiency

Total computation time (hours)



# gridMathematica tuning

- Keep master kernel responsive
- `$HistoryLength = 10`
- Use `PSExec` to start remote slave kernels
- Restart `MathLM` upon restarting grid

# Questions