Rapid Application Prototyping With GAMS

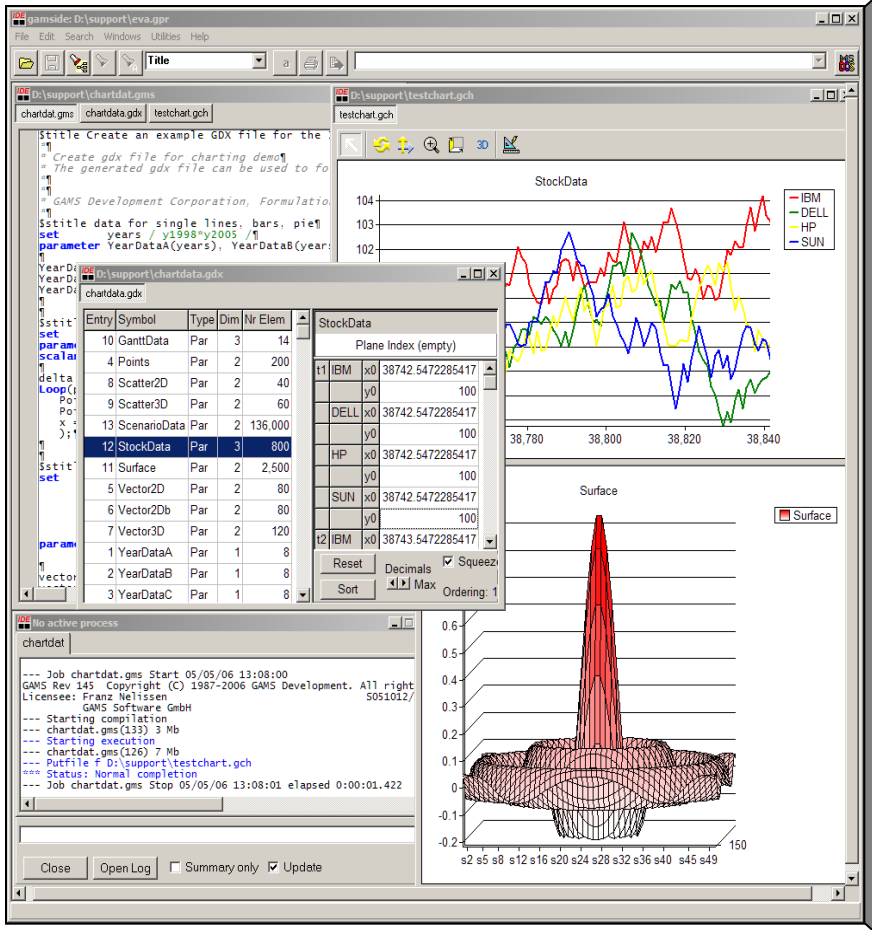
Steve Dirkse sdirkse@gams.com

GAMS Development Corporation

www.gams.com

INFORMS 2010 Austin

GAMS at a Glance



Algebraic Modeling System

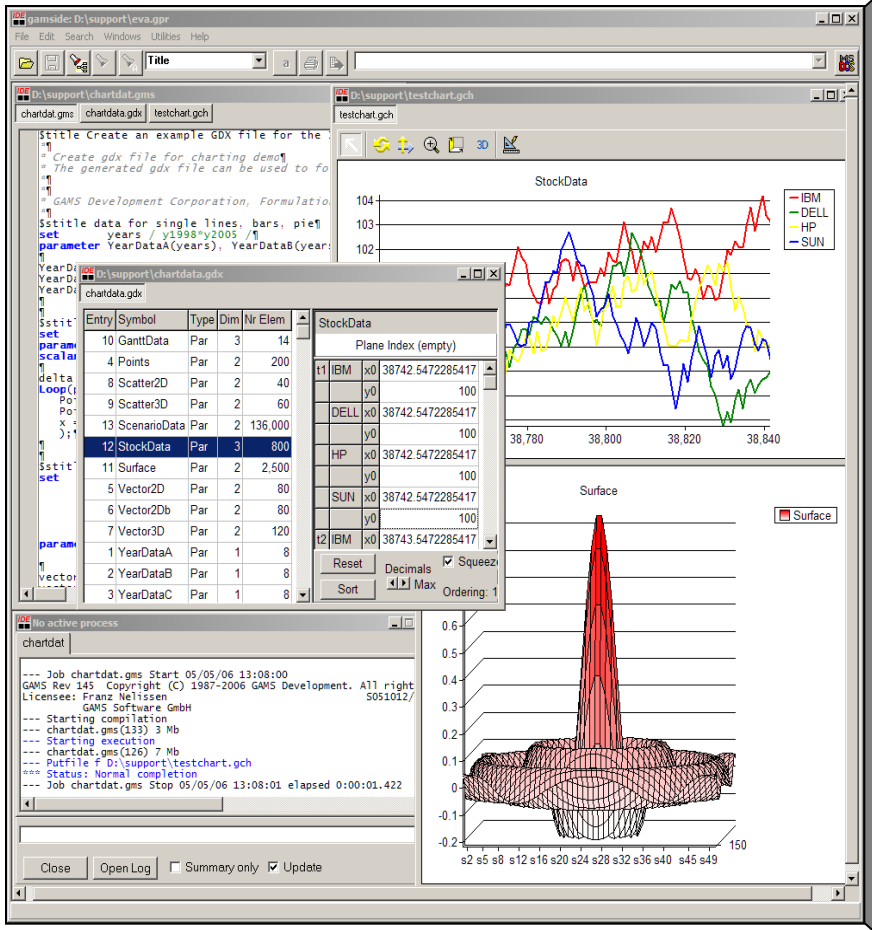
- Facilitates to formulate mathematical optimization problems similar to algebraic notation

  ➔ Simplified model building

- Provides links to appropriate state-of-the-art external algorithms

  ➔ Efficient solution process

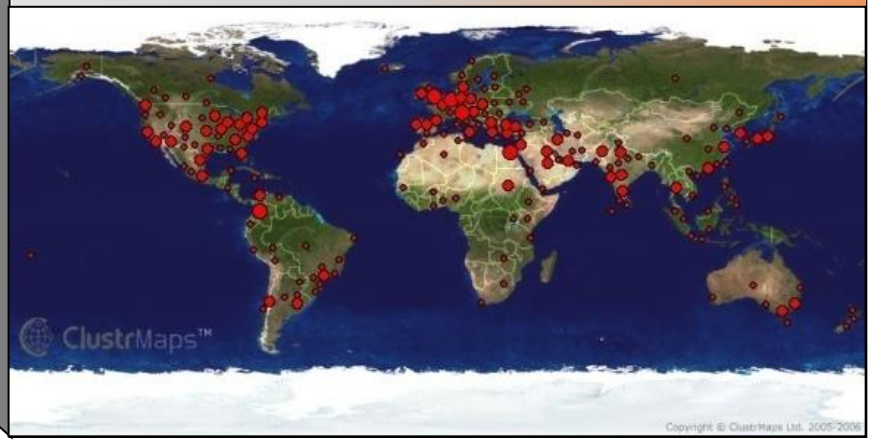
GAMS at a Glance



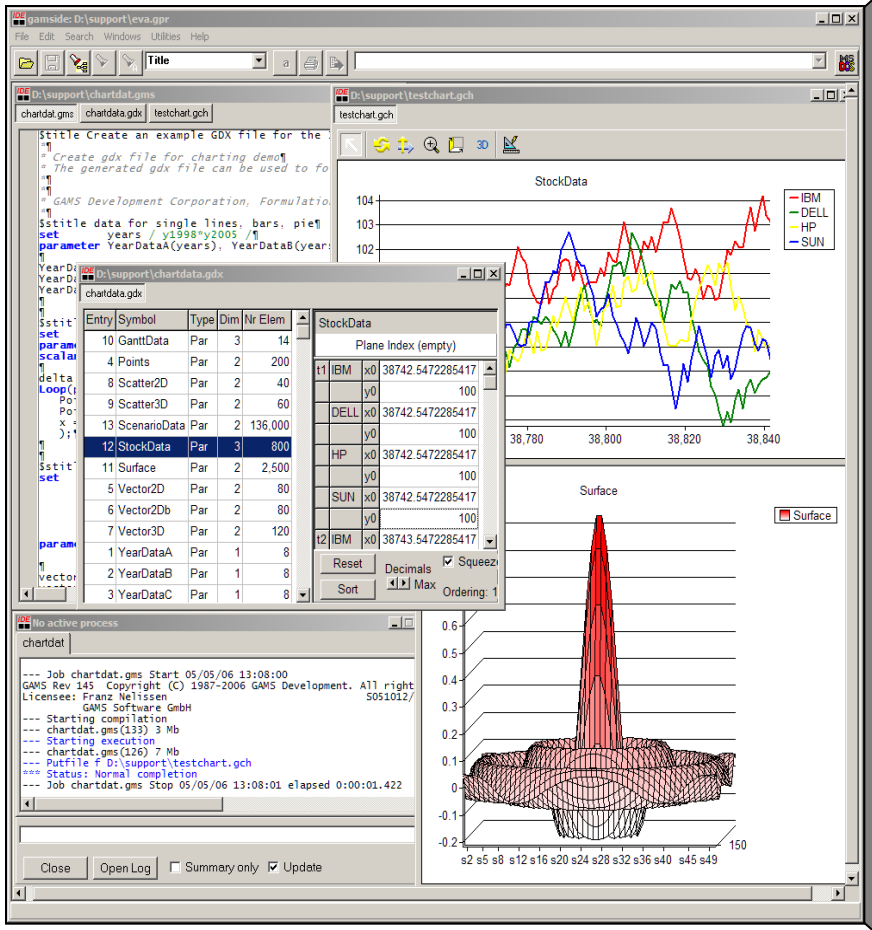
General **A**lgebraic **M**odeling **S**ystem

- Roots: World Bank, 1976
- Went commercial in 1987
- GAMS Development Corp.
- GAMS Software GmbH

- Broad academic & commercial user community and network



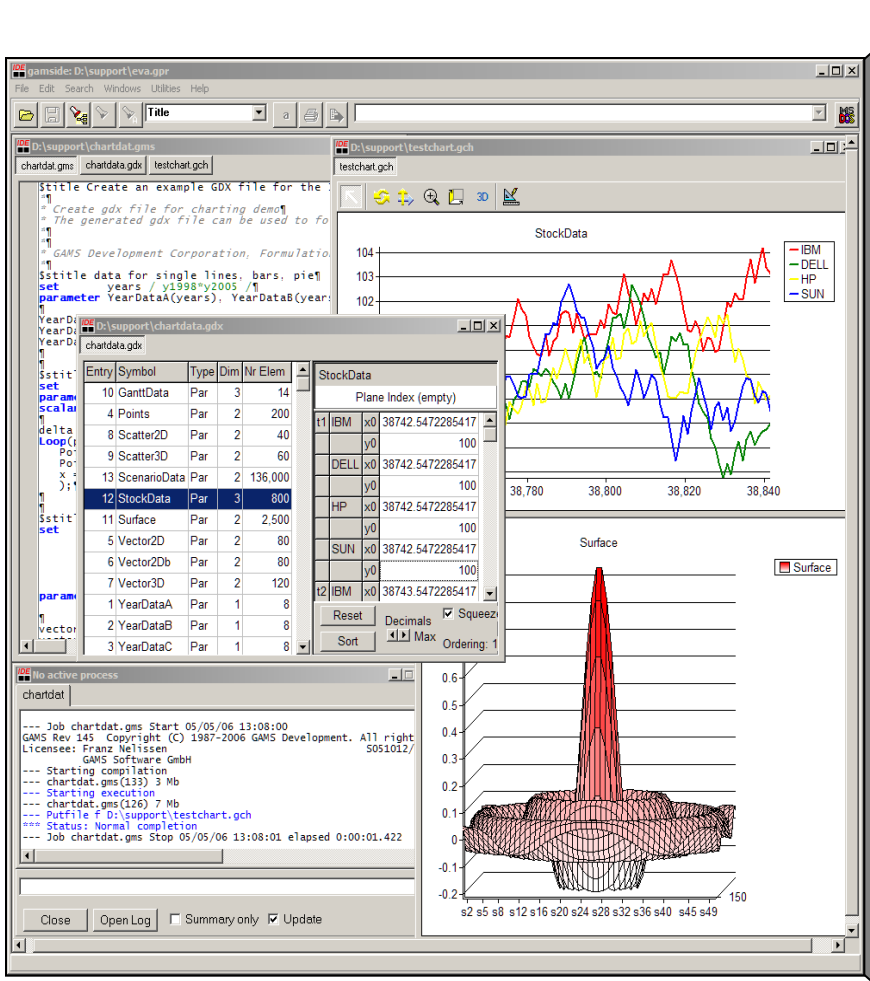
GAMS at a Glance

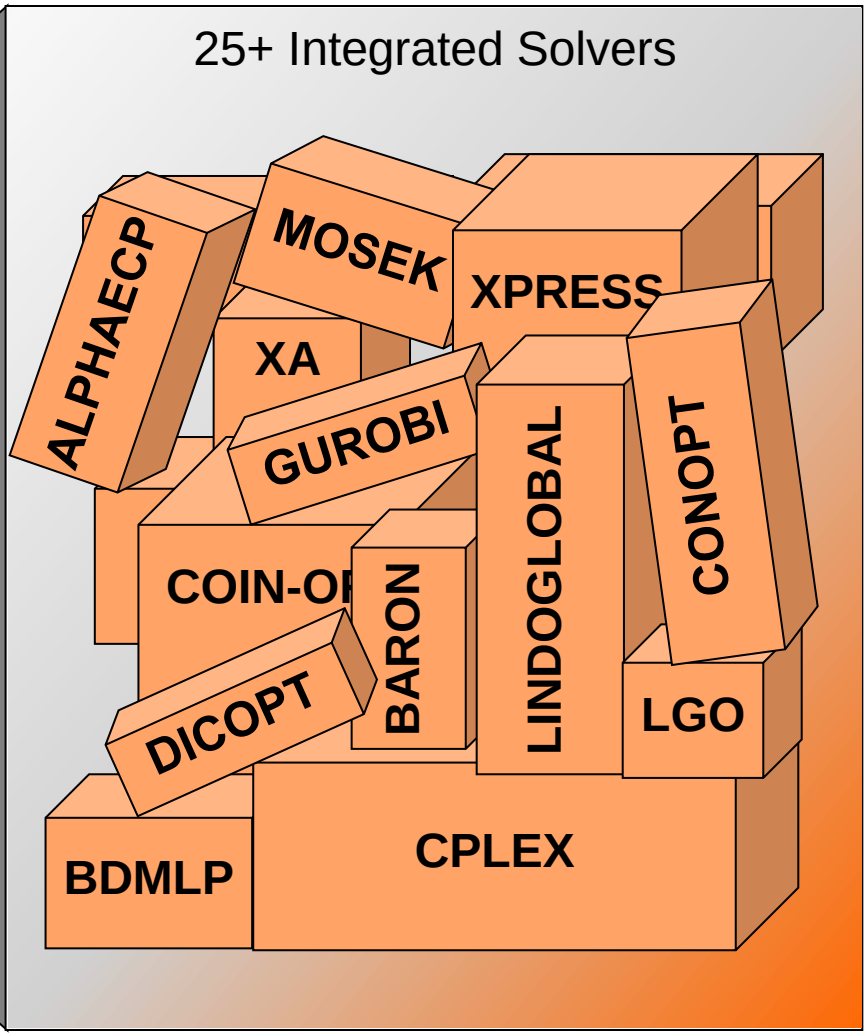


General **A**lgebraic **M**odeling **S**ystem

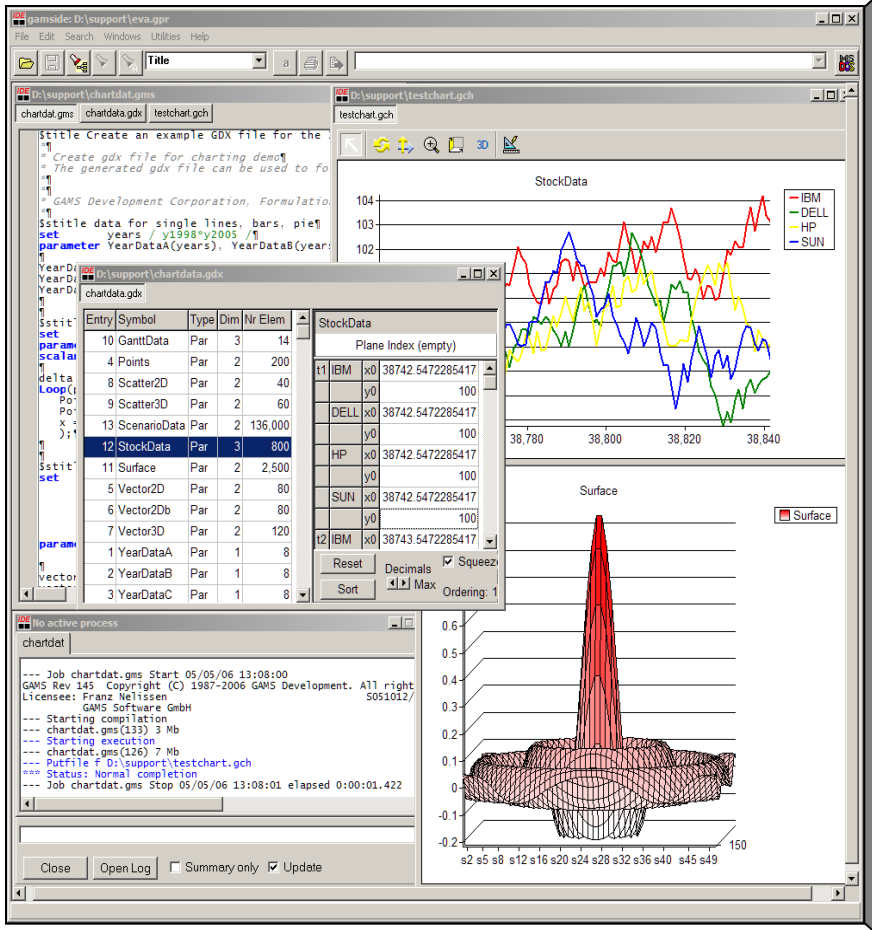
- Algebraic Modeling Language
- 25+ Integrated Solvers
- 10+ Supported MP classes
- 10+ Supported Platforms
- Connectivity- & Productivity Tools
  - IDE
  - Model Libraries
  - GDX, Interfaces & Tools
  - Grid Computing
  - Benchmarking
  - Compression & Encryption
  - Deployment System
  - …

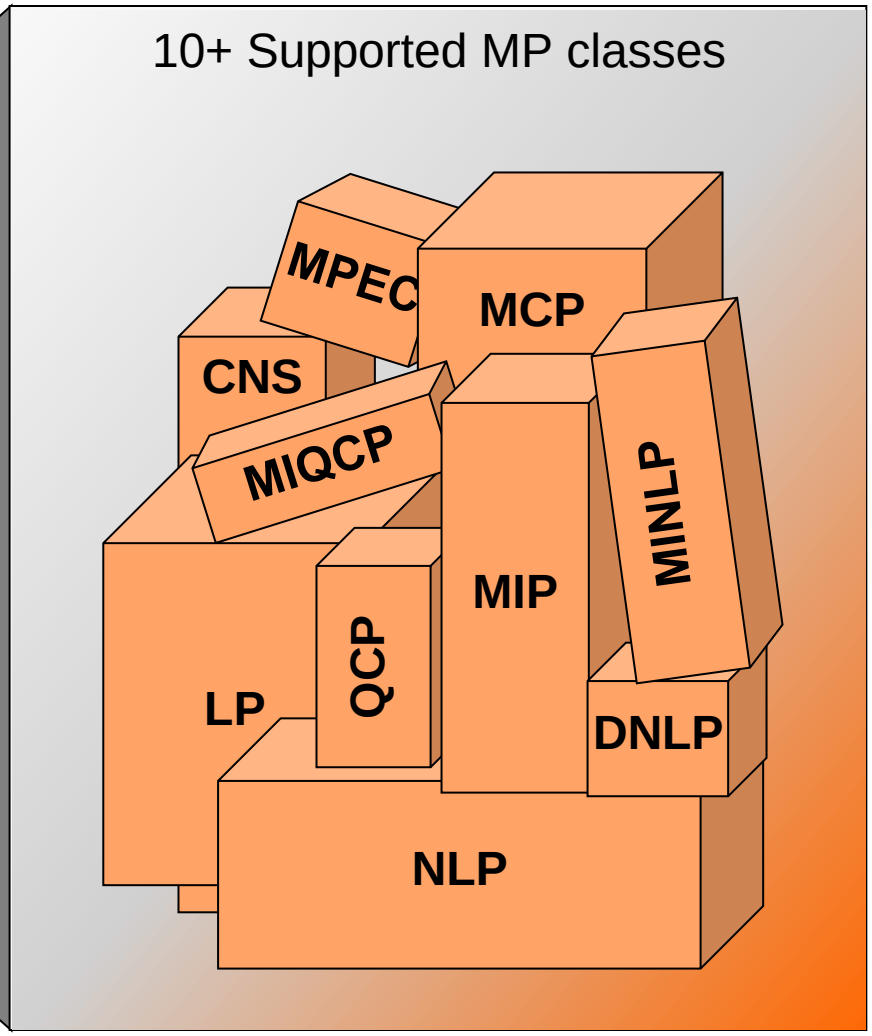
GAMS at a Glance



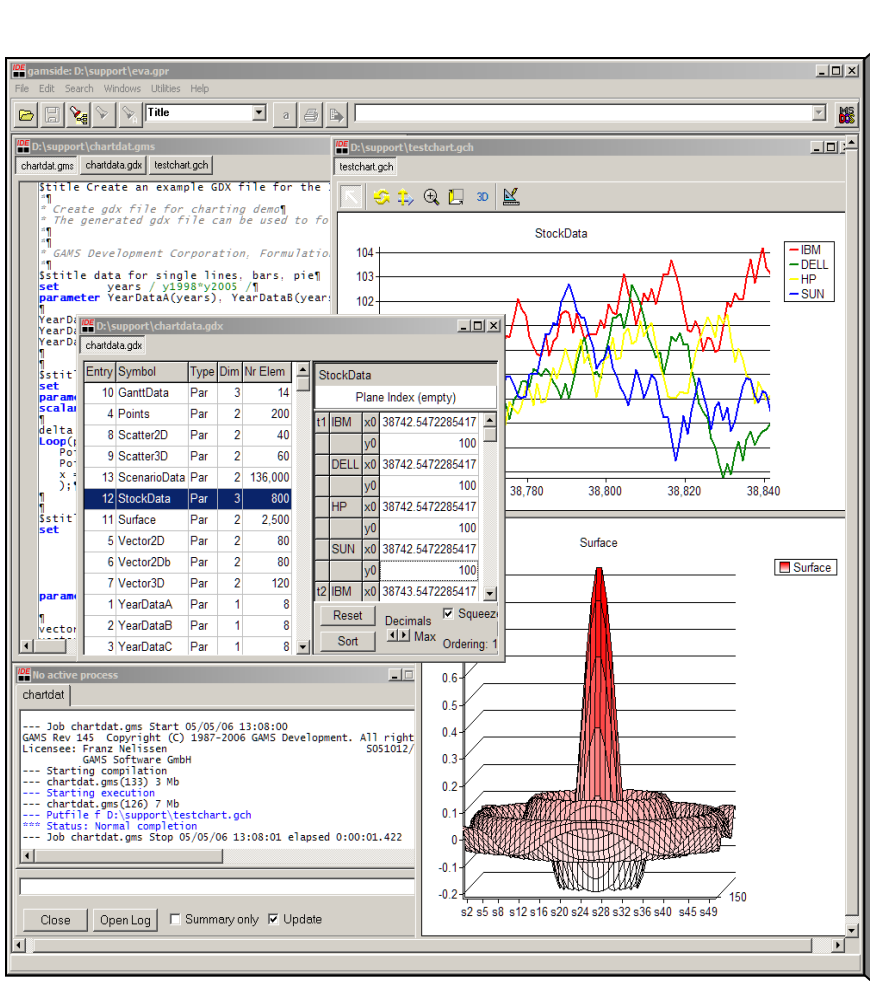


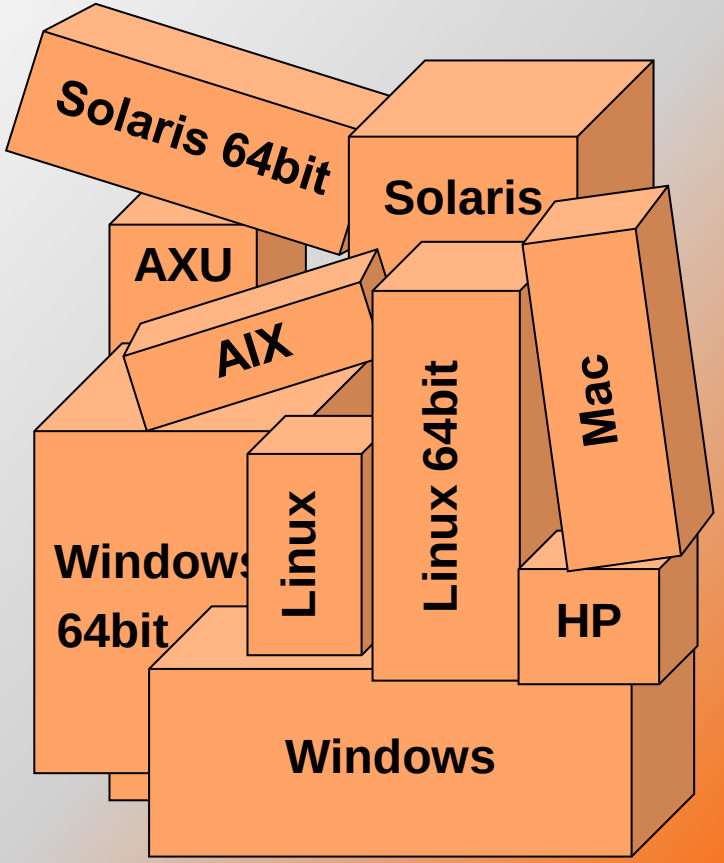
GAMS at a Glance





GAMS at a Glance





GAMS' Fundamental concepts

- **Platform independence**
- **Open architecture and interfaces to other systems**
- **Balanced mix of declarative and procedural elements**
  - Declaration of Sets, Parameters, Variables, Equations, Models, …
  - Procedural Elements like loops, if-then-else, …
- **Layers of separation**

GAMS' Fundamental concepts

- **Different layers with separation of**
  - model and data
  - model and solution methods
  - model and operating system
  - model and interface

→ Models benefit from

- advancing hardware
- enhanced / new solver technology
- improved / upcoming interfaces to other systems

GAMS 23.6 Beta

- Released yesterday! www.gams.com/beta

- Chk4Upd
- Python API
- GAMSIDE updates
- XLSDump
- New Solver Libraries (COIN-OR, CPLEX, GUROBI, KNITRO, MOSEK, SCIP, XPRESS)
- New library models (DATALIB, EMPLIB, MODELLIB, TESTLIB)
- Internal reorganization

Basic Sudoku

Address http://www.dailysudoku.com/sudoku/index.shtml

Daily SuDoku

- Home
- Today's SuDoku
- SuDoku Archive
- SuDoku for Kids
- Draw/Play
- Discussion
- FAQ
- Books
- Syndication
- Links
- Email and News
- Contact

Welcome to the Daily SuDoku!

Classic | Monster | Kids | Squiggly

Today's SuDoku is shown on the right. Click the grid to download a printable version of the puzzle. Visit **the archive** for previous daily puzzles and solutions. Play online, print a Sudoku, solve and get hints using the new improved **Draw/Play** function.

But how do I do it?

The object is to insert the numbers in the boxes to satisfy only one condition: each row, column and 3x3 box must contain the digits 1 through 9 exactly once. What could be simpler?

The rules of the new **Monster Sudokus** are exactly the same, but more numbers and letters are needed.

						6		1
			7	3	1			4
5					9			
6			2				1	
		8				4		
	1				5			8
			9					3
7			8	6	3			
9		2						

Daily SuDoku: Thu 2-Nov-2006 very hard

(c) Daily Sudoku Ltd 2006. All rights reserved.

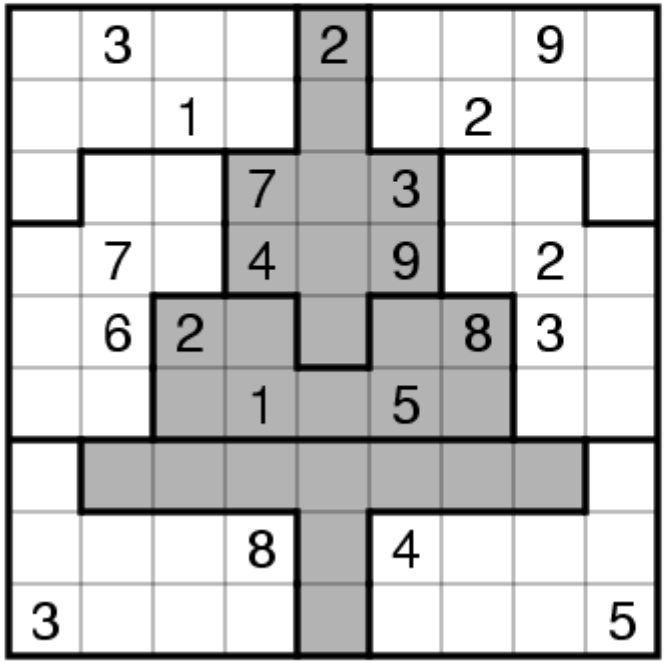
Christmas Tree Sudoku

Address http://www.dailysudoku.com/sudoku/archive.shtml?year=2005&month=12&day=23&type=seasonal

Daily SuDoku

- Home
- Today's SuDoku
- SuDoku Archive
- SuDoku for Kids
- Draw/Play
- Discussion
- FAQ
- Books
- Syndication
- Links
- Email and News
- Contact

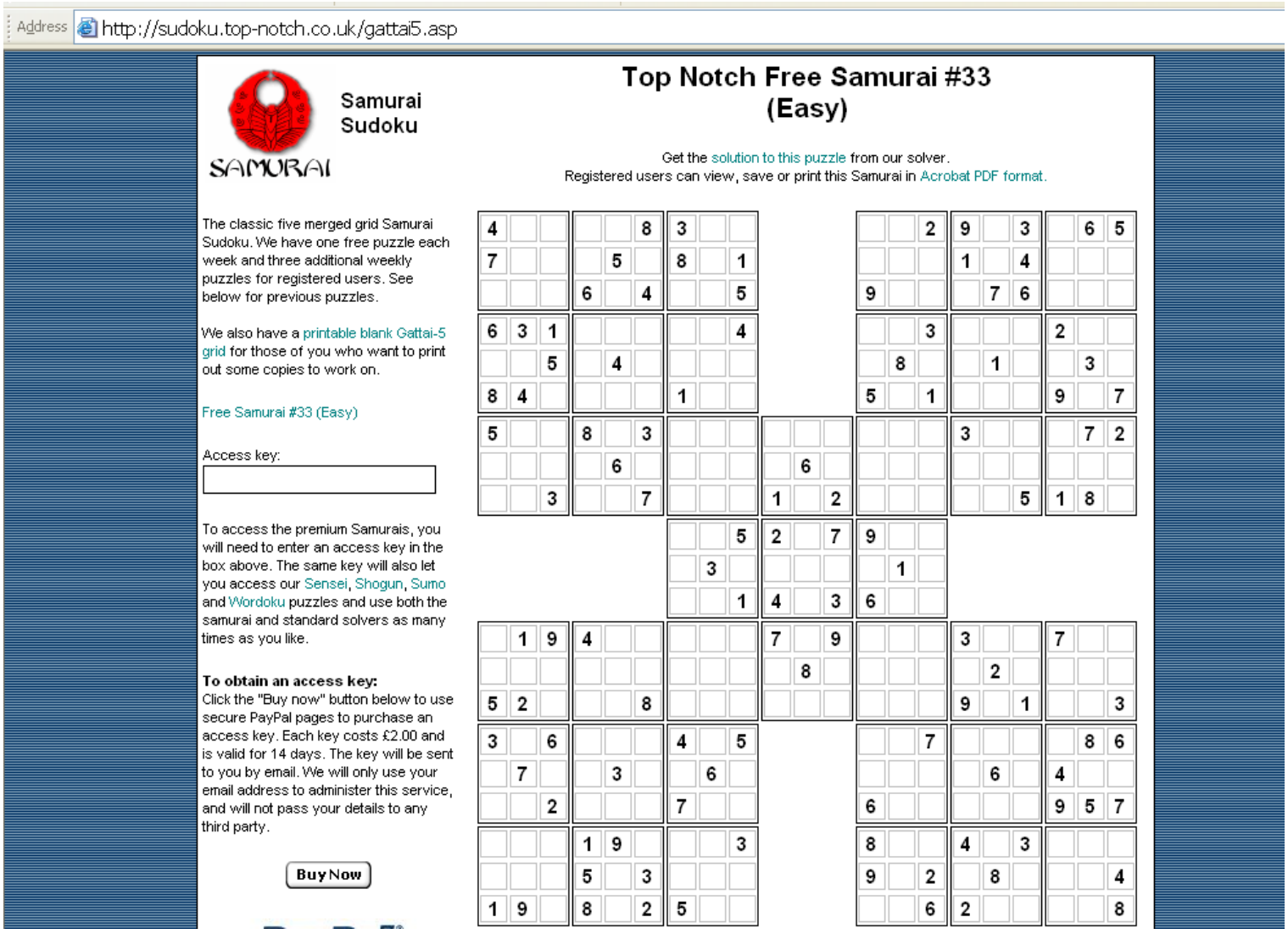
Daily Seasonal Sudoku: Fri 23-Dec-2005 [instructions]



(c) Daily Sudoku Ltd 2005. All rights reserved.

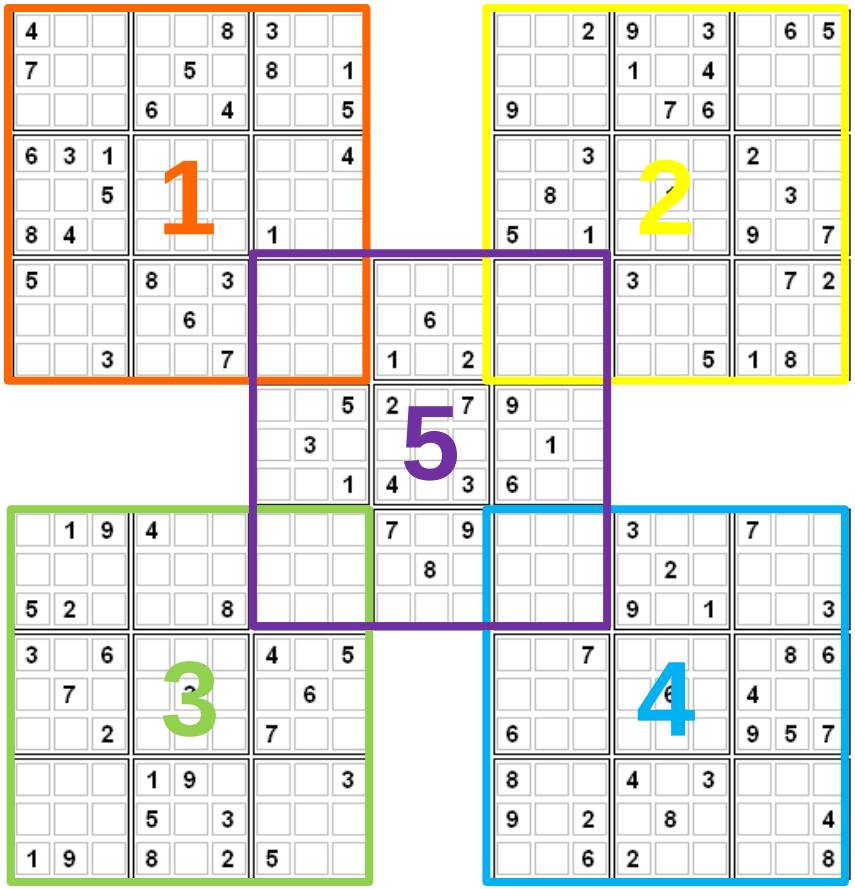
Christmas tree Sudoku: Fri 23-Dec-2005 very hard

Samurai Sudoku

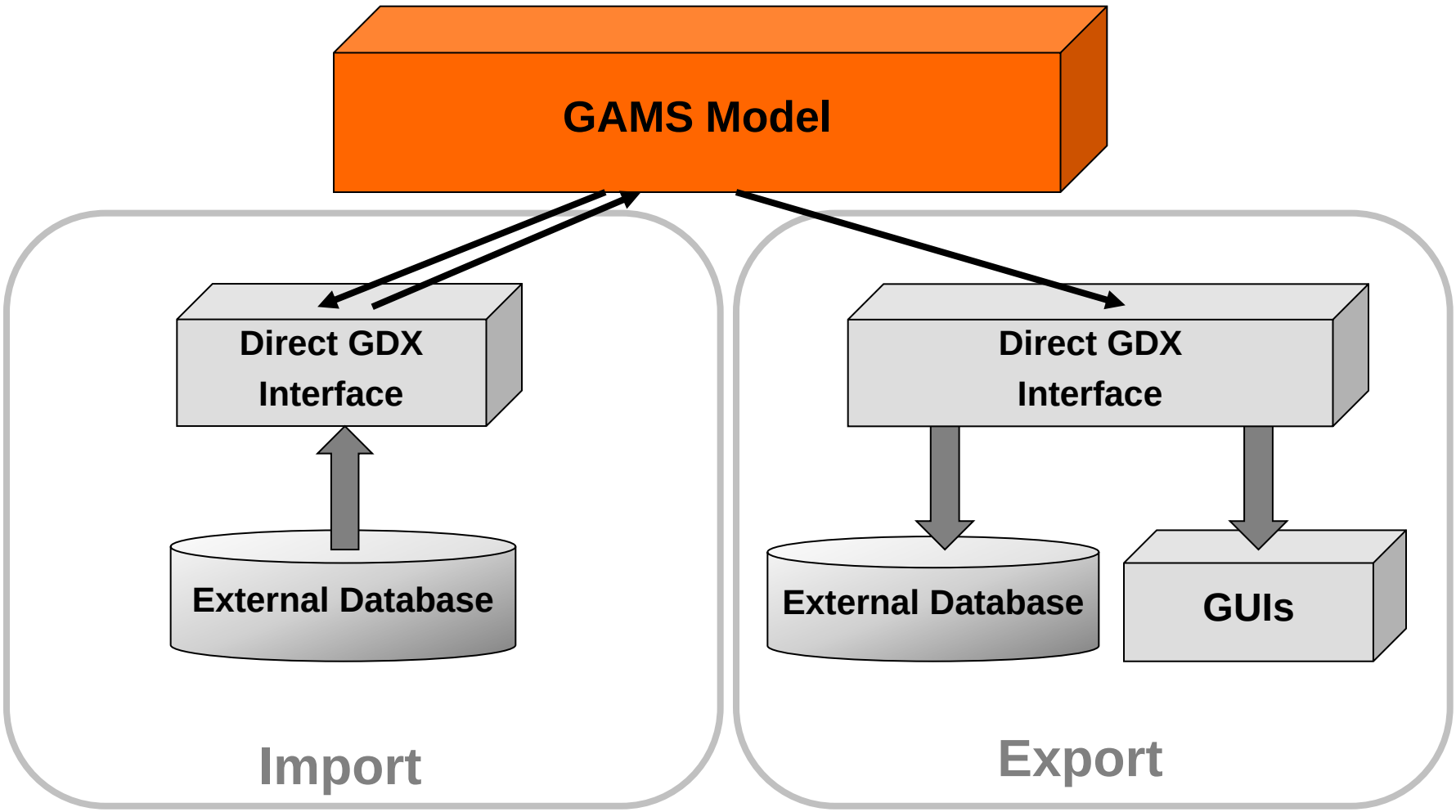


Demo: Mapping data (map1)

- We solve the Samurai as 5 basic puzzles, with linking constraints for the overlapping cells
- Requires mapping 21x21 Samurai puzzle into 5 separate 9x9 puzzles



GAMS in Control



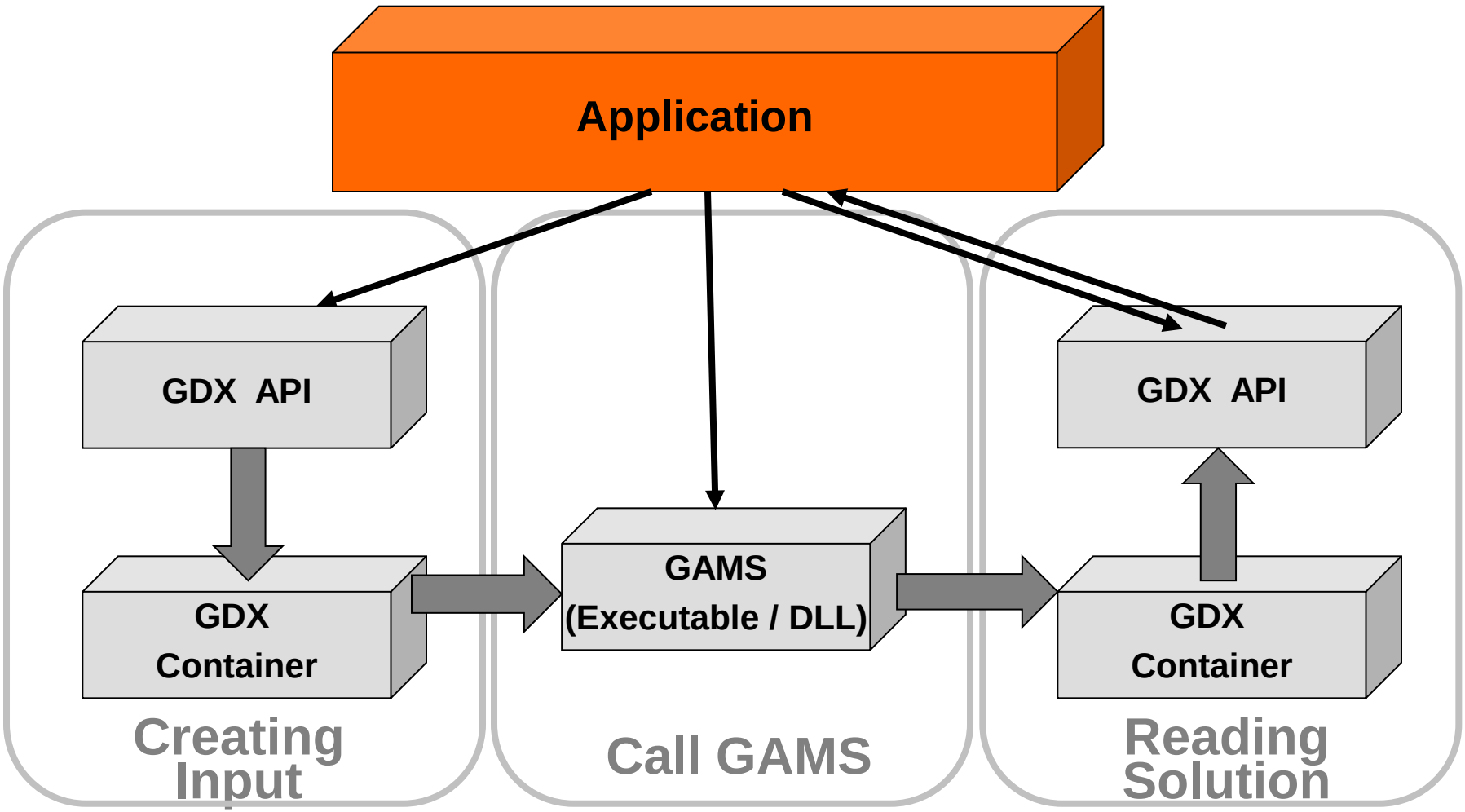
Calling GAMS from an Application

Creating Input for GAMS Model
Callout to a GAMS Process/Executable
Reading Output from GAMS Model

- Works from basically every environment
  - Web application (server side)
  - Application Builder
    - Oracle, Eclipse, .NET, …
    - Regular Programming language C++, Java, VB, …
  - MS Office Application / VBA

- Integrates with existing user IT infrastructure

Application in Control



Contacting GAMS

Europe

GAMS Software GmbH
Eupener Str. 135-137
50933 Cologne
Germany

Phone: +49 221 949 9170
Fax: +49 221 949 9171
http://www.gams.de

info@gams.de
support@gams-software.com

USA

GAMS Development Corp.
1217 Potomac Street, NW
Washington, DC 20007
USA

Phone: +1 202 342 0180
Fax: +1 202 342 0181
http://www.gams.com

sales@gams.com
support@gams.com