



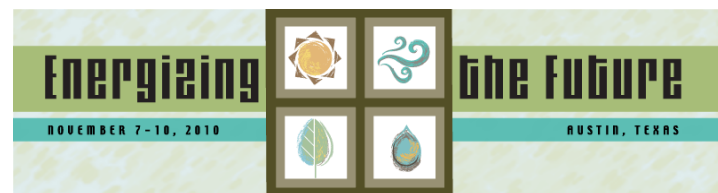
Rapid Application Prototyping With GAMS

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GAMS at a Glance

The screenshot displays the GAMS software interface with several components:

- Code Editor:** Contains GAMS code for creating an example GDY file for charting.
- Data Table:** A table listing model elements with columns for Entry, Symbol, Type, Dim, and Nr Elem. The selected entry is:

Entry	Symbol	Type	Dim	Nr Elem
10	GanttData	Par	3	14
4	Points	Par	2	200
8	Scatter2D	Par	2	40
9	Scatter3D	Par	2	60
13	ScenarioData	Par	2	136,000
12	StockData	Par	3	800
11	Surface	Par	2	2,500
5	Vector2D	Par	2	80
6	Vector2Db	Par	2	80
7	Vector3D	Par	2	120
1	YearDataA	Par	1	8
2	YearDataB	Par	1	8
3	YearDataC	Par	1	8

- StockData Plot:** A line graph showing the stock prices of IBM, DELL, HP, and SUN over time.
- Surface Plot:** A 3D surface plot showing a complex, multi-peaked surface.
- Log Window:** Displays the execution log, including job start and stop times, compilation status, and file paths.

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 Algebraic Modeling System

- Roots: World Bank, 1976
- Went commercial in 1987
- GAMS Development Corp.
- GAMS Software GmbH
- Broad academic & commercial user community and network

The screenshot shows the GAMS software interface with the following components:

- Code Editor:** Contains GAMS code for creating an example GDx file for charting. The code includes comments and parameters for data sets.
- Data Table:** A table listing model elements with columns for Entry, Symbol, Type, Dim, and Nr Elem. The 'StockData' entry is highlighted.
- StockData Chart:** A line chart showing the stock prices of IBM, DELL, HP, and SUN over time. The y-axis ranges from 102 to 104, and the x-axis ranges from 38,780 to 38,840.
- Surface Chart:** A 3D surface plot showing a sharp peak. The y-axis ranges from -0.2 to 0.6, and the x-axis ranges from s2 to s49.
- Log Window:** Shows the execution log for 'chartdat.gms', including start and stop times and file paths.





GAMS at a Glance

General Algebraic Modeling System

- 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
 - ...

The screenshot displays the GAMS IDE interface. On the left, a code editor shows GAMS code for creating a GDX file and defining data. Below the code is a table listing model elements:

Entry	Symbol	Type	Dim	Nr Elem
10	GanttData	Par	3	14
4	Points	Par	2	200
8	Scatter2D	Par	2	40
9	Scatter3D	Par	2	60
13	ScenarioData	Par	2	136,000
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7	Vector3D	Par	2	120
1	YearDataA	Par	1	8
2	YearDataB	Par	1	8
3	YearDataC	Par	1	8

On the right, there are two plots. The top plot, titled 'StockData', shows a line graph with four series: IBM (red), DELL (green), HP (yellow), and SUN (blue). The x-axis represents years from 1980 to 1990, and the y-axis represents stock prices from 102 to 104. The bottom plot, titled 'Surface', shows a 3D surface plot with a prominent peak. The x-axis is labeled with 's2 s5 s8 s12 s16 s20 s24 s28 s32 s36 s40 s45 s49' and the y-axis ranges from -0.2 to 0.6.

At the bottom, a log window shows the execution status of the job 'chartdat.gms', indicating it started on 05/05/06 at 13:08:00 and completed normally at 13:08:01, with an elapsed time of 0:00:01.422.



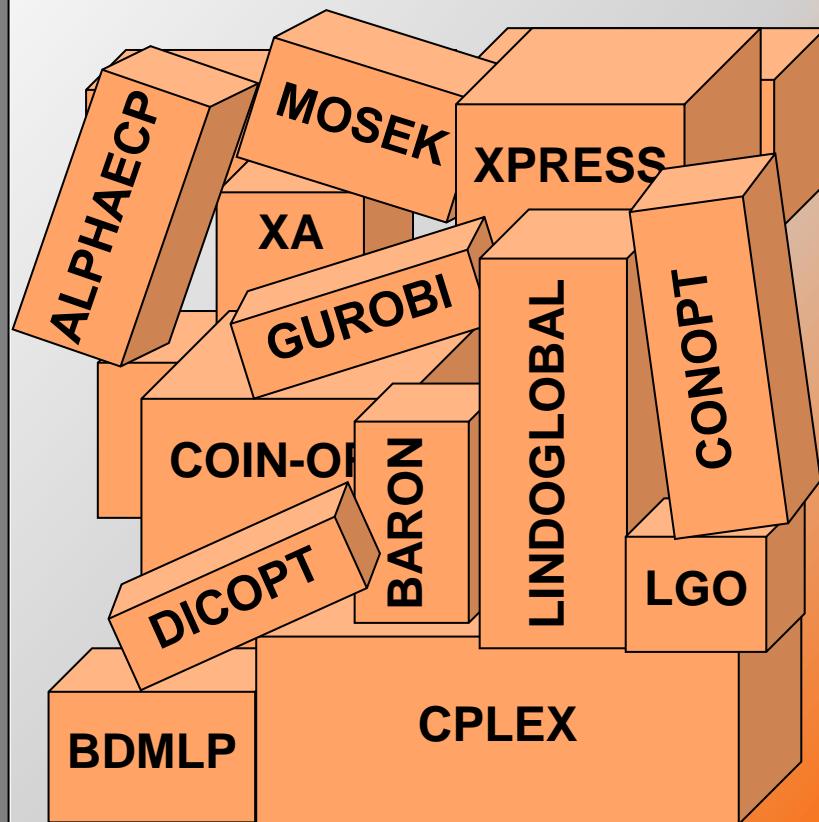
GAMS at a Glance

The screenshot displays the GAMS software interface with several components:

- Code Editor:** Shows GAMS code for creating an example GDx file and defining data for single lines, bars, and pie charts.
- StockData Chart:** A line chart showing stock prices for IBM, DELL, HP, and SUN over time.
- Surface Plot:** A 3D surface plot showing a sharp peak.
- Table:** A table listing model elements with columns for Entry, Symbol, Type, Dim, and Nr Elem.
- Log Window:** Shows the execution log, including job start and stop times, compilation details, and status messages.

Entry	Symbol	Type	Dim	Nr Elem
10	GanttData	Par	3	14
4	Points	Par	2	200
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25+ Integrated Solvers





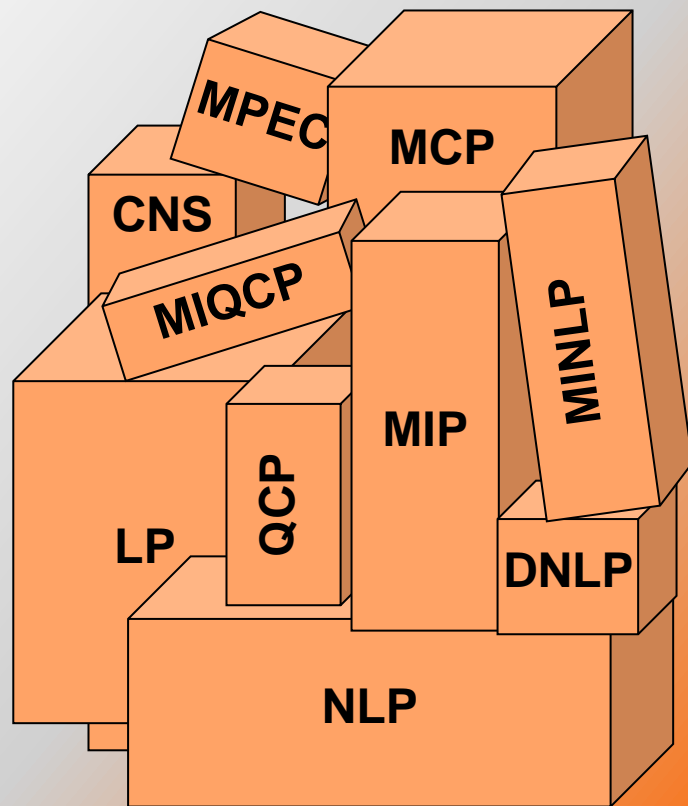
GAMS at a Glance

The screenshot displays the GAMS software interface with the following components:

- Code Editor:** Contains GAMS code for creating an example GDY file for charting. The code includes comments and commands like `set years /1998*2005 /` and `parameter YearDataA(years), YearDataB(years);`.
- Data Table:** A table listing model elements:

Entry	Symbol	Type	Dim	Nr Elem
10	GanttData	Par	3	14
4	Points	Par	2	200
8	Scatter2D	Par	2	40
9	Scatter3D	Par	2	60
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- StockData Plot:** A line graph showing stock prices for IBM, DELL, HP, and SUN over time. The y-axis ranges from 102 to 104, and the x-axis ranges from 38,780 to 38,840.
- Surface Plot:** A 3D surface plot showing a sharp peak. The y-axis ranges from -0.2 to 0.6, and the x-axis ranges from s2 to s49.
- Log Window:** Shows the execution log for the job `chartdat.gms`, including start and stop times and file sizes.

10+ Supported MP classes



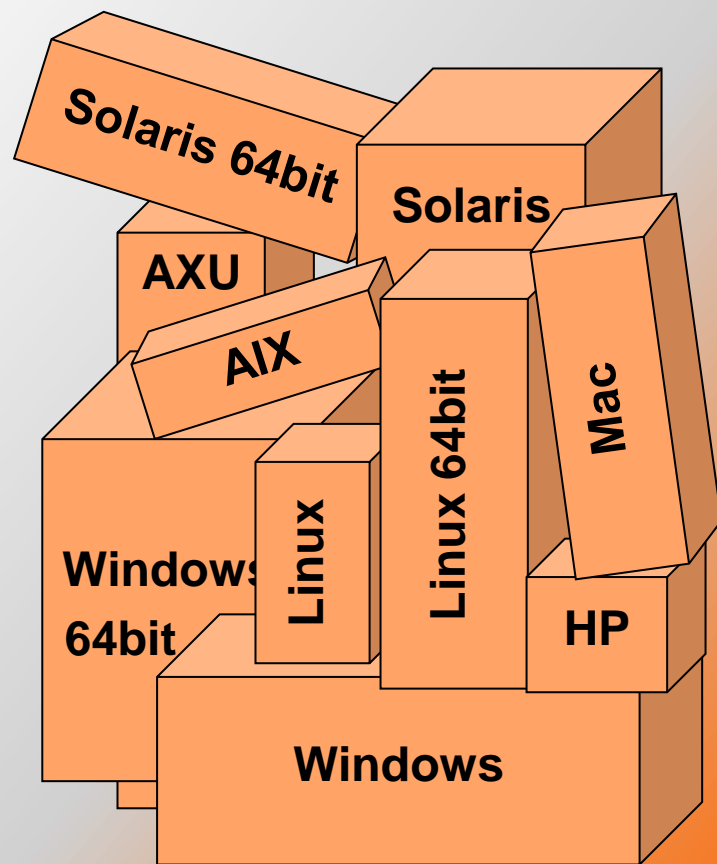


GAMS at a Glance

The screenshot displays the GAMS software interface with several components:

- Code Editor:** Shows GAMS code for creating an example GDX file for charting. The code includes comments and commands like `set years = y1998:y2005 /;` and `parameter YearDataA(years), YearDataB(years);`.
- StockData Chart:** A line chart showing stock data for IBM, DELL, HP, and SUN from 1998 to 2005. The y-axis ranges from 102 to 104, and the x-axis shows years.
- Table:** A table listing GDX entries with columns for Entry, Symbol, Type, Dim, and Nr Elem. The 'StockData' entry is highlighted.
- Surface Plot:** A 3D surface plot showing a sharp peak. The y-axis ranges from -0.2 to 0.6, and the x-axis shows scenario indices (s2 to s49).
- Log Window:** Shows the execution log for 'chartdat.gms', including start and stop times, memory usage, and status messages.

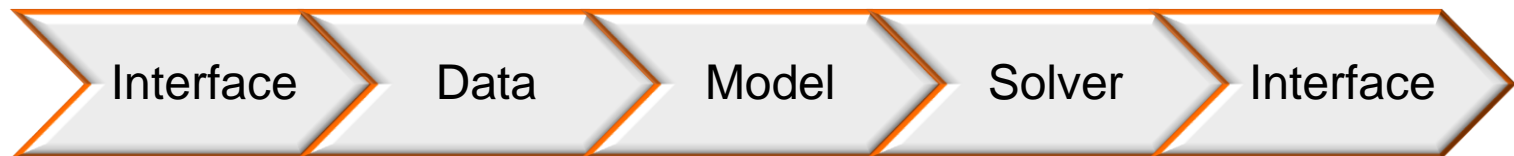
10+ Supported Platforms





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**





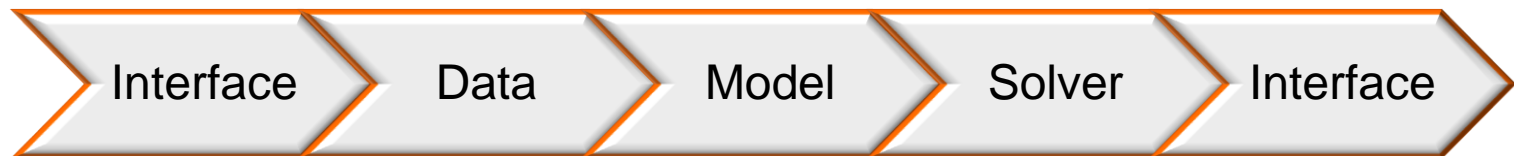
GAMS' Fundamental concepts

- **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

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Welcome to the Daily SuDoku!

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.

Classic

Monster

Kids

Squiggly

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

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Daily SuDoku: Thu 2-Nov-2006

very hard



Christmas Tree Sudoku

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

Daily SuDoku



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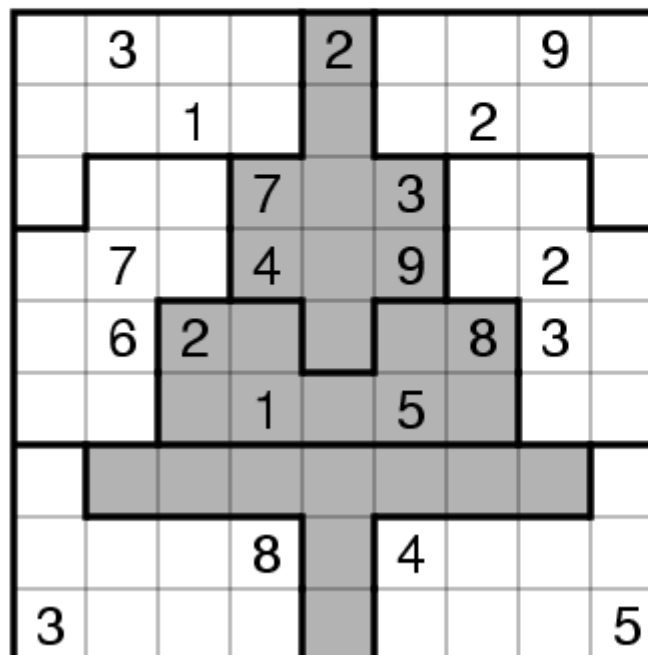
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Daily Seasonal Sudoku: Fri 23-Dec-2005 [\[instructions\]](#)



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



Samurai Sudoku

Address <http://sudoku.top-notch.co.uk/gattai5.asp>



Samurai
Sudoku

SAMURAI

Top Notch Free Samurai #33 (Easy)

Get the [solution to this puzzle](#) from our solver.

Registered users can view, save or print this Samurai in [Acrobat PDF format](#).

The classic five merged grid Samurai Sudoku. We have one free puzzle each week and three additional weekly puzzles for registered users. See below for previous puzzles.

We also have a [printable blank Gattai-5 grid](#) for those of you who want to print out some copies to work on.

[Free Samurai #33 \(Easy\)](#)

Access key:

To access the premium Samurais, you will need to enter an access key in the box above. The same key will also let you access our [Sensei](#), [Shogun](#), [Sumo](#) and [Wordoku](#) puzzles and use both the samurai and standard solvers as many times as you like.

To obtain an access key:

Click the "Buy now" button below to use secure PayPal pages to purchase an access key. Each key costs £2.00 and is valid for 14 days. The key will be sent to you by email. We will only use your email address to administer this service, and will not pass your details to any third party.

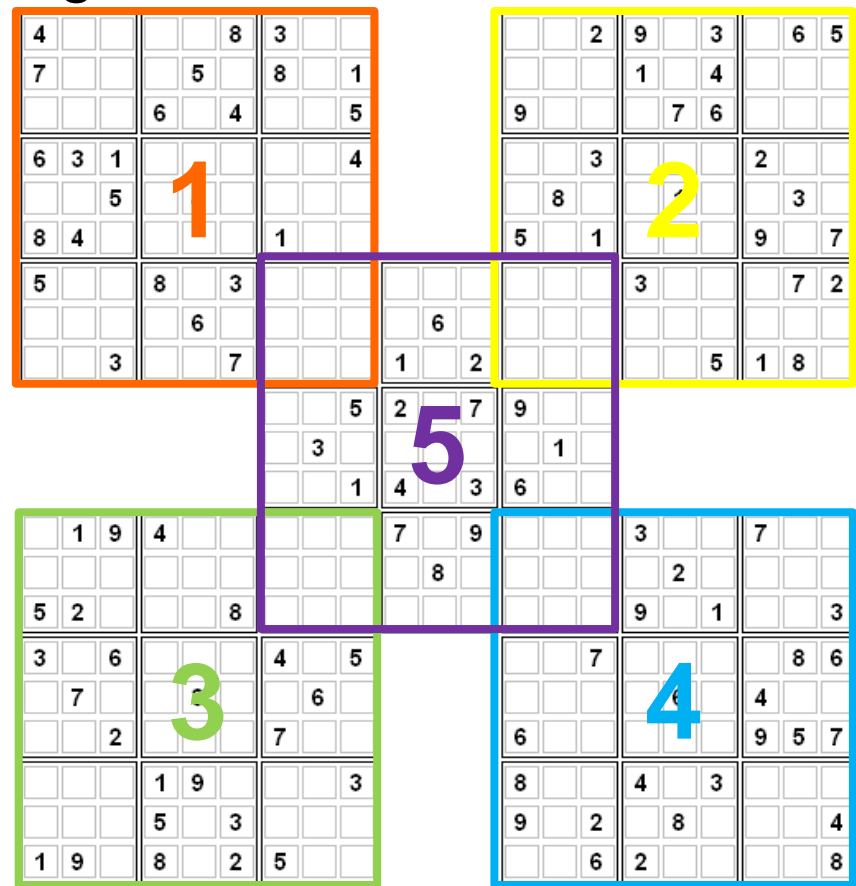
[Buy Now](#)

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



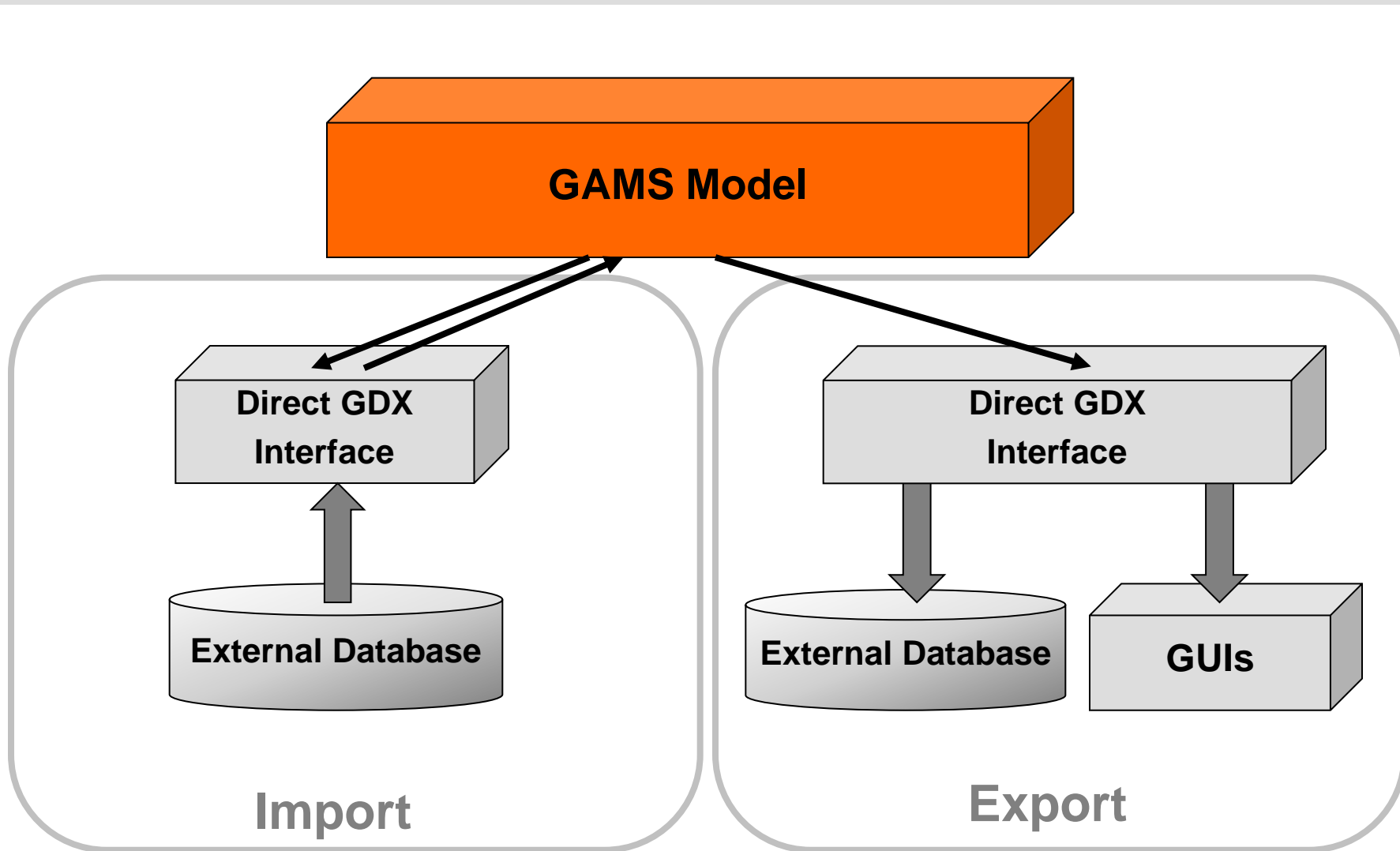
Demo: Mapping data (map1)

- 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

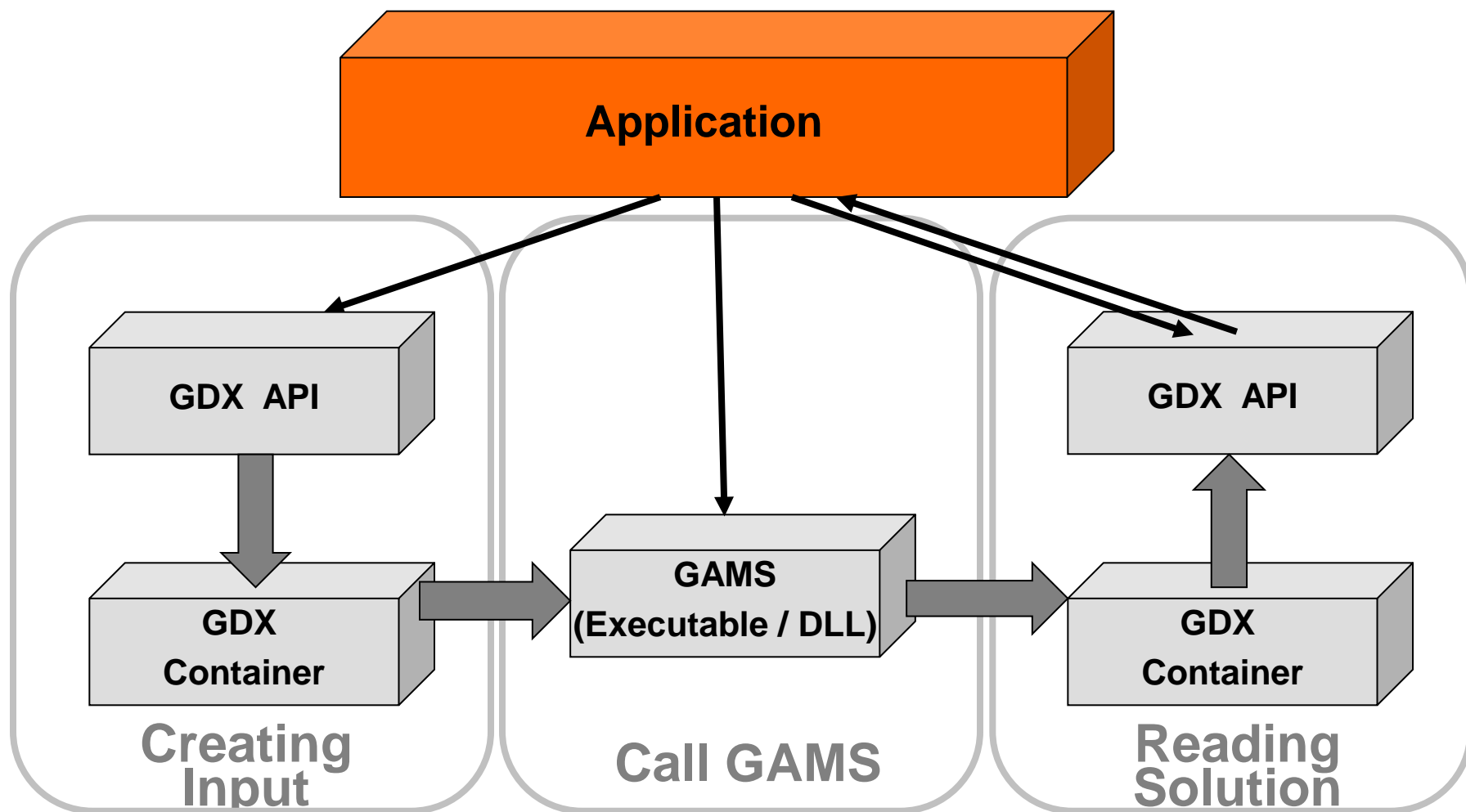
Callout to a GAMS Process/Executable

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

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