GAMS

Interfacing with other Applications

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Input/Output through ASCII Files

- ASCII Input Data
  - Part of model input (**`$include file.txt`**)
  - Posix Utilities are part of GAMS Windows System
    - Platform independent data file preparation
    - sed, awk, grep, cut, …

```
$call cut -d, -f1,3-5 file.txt > filenew.txt
```

- ASCII File Output
  - GAMS Put Facilities

```
file fy /result.csv/;
fy.pc = 5; fy.nd = 4;
loop((i,j)$x.l(i,j),
  put fy i.te(i) j.te(j) x.l(i,j) /;
);
```

Data from CSV File

```
Table d(i,j) distance in thousands of miles
                 new-york    chicago     topeka
seattle          2.5         1.7         1.8
san-diego        2.5         1.8         1.4  ;
```

```
Table d(i,j) distance in thousands of miles
$ondelim
$include dist.csv
$offdelim
```

```
city,new-york,chicago,topeka
seattle,2.5,1.7,1.8
san-diego,2.5,1.8,1.4
```

Separation of Declaration and Definition

```
Table d(i,j) distance in thousands of miles
                  new-york    chicago     topeka
seattle           2.5         1.7         1.8
san-diego         2.5         1.8         1.4  ;
```

```
Parameter d(i,j) distance in thousands of miles;
…
$include dist.inc
```

```
d("SEATTLE","NEW-YORK") = 2.5;
d("SAN-DIEGO","NEW-YORK") = 2.5;
d("SEATTLE","CHICAGO") = 1.7;
d("SAN-DIEGO","CHICAGO") = 1.8;
d("SEATTLE","TOPEKA") = 1.8;
d("SAN-DIEGO","TOPEKA") = 1.4;
```

Separation of Declaration and Definition

```
Table d(i,j) distance in thousands of miles
                  new-york    chicago     topeka
seattle           2.5         1.7         1.8
san-diego         2.5         1.8         1.4  ;
```

```
Parameter d(i,j) distance in thousands of miles /
$include dist.inc
/;
```

```
SEATTLE.NEW-YORK 2.5
SAN-DIEGO.NEW-YORK 2.5
SEATTLE.CHICAGO 1.7
SAN-DIEGO.CHICAGO 1.8
SEATTLE.TOPEKA 1.8
SAN-DIEGO.TOPEKA 1.4
```

Data from ASCII File

```
Table d(i,j) distance in thousands of miles
                  new-york    chicago     topeka
seattle           2.5         1.7         1.8
san-diego         2.5         1.8         1.4  ;
```

```
Parameter d(i,j) distance in thousands of miles /
$ondelim
$include dist.txt
$offdelim
/;
```

```
SEATTLE,NEW-YORK,2.5
SAN-DIEGO,NEW-YORK,2.5
SEATTLE,CHICAGO,1.7
SAN-DIEGO,CHICAGO,1.8
SEATTLE,TOPEKA,1.8
SAN-DIEGO,TOPEKA,1.4
```

Default Output in .lst File

```
---- VAR x  shipment quantities in cases

                          LOWER      LEVEL      UPPER    MARGINAL

seattle  .new-york           .       50.000     +INF          .
seattle  .chicago            .      300.000     +INF          .
seattle  .topeka             .          .       +INF        0.036
san-diego.new-york           .      275.000     +INF          .
san-diego.chicago            .          .       +INF        0.009
san-diego.topeka             .      275.000     +INF          .
```

Default Output using Display Statement

```
----     68 VARIABLE x.L  shipment quantities in cases

                new-york      chicago       topeka

seattle          50.000      300.000
san-diego       275.000                    275.000


----     68 VARIABLE x.M  shipment quantities in cases

                chicago       topeka

seattle                        0.036
san-diego          0.009
```

Output using Put Utility

```
file fx /result.txt/;

put fx 'Shipped quantities between plants and markets' /;
put    '----------------------------------------' /;
loop((i,j)$x.l(i,j),
  put 'Shipment from 'i.te(i):10' to 'j.te(j):10' in cases:'
      x.l(i,j) /;
);
putclose;
```

```
Shipped quantities between plants and markets
----------------------------------------
Shipment from seattle    to new-york   in cases:       50.00
Shipment from seattle    to chicago    in cases:      300.00
Shipment from san-diego  to new-york   in cases:      275.00
Shipment from san-diego  to topeka     in cases:      275.00
```

Output using Put Utility

```
file fy /result.csv/;
fy.pc = 5;

put fy ;
loop((i,j)$x.l(i,j),
  put i.te(i) j.te(j) x.l(i,j) /;
);
putclose;
```

```
"seattle","new-york",50.00
"seattle","chicago",300.00
"san-diego","new-york",275.00
"san-diego","topeka",275.00
```

Hands-on! ASCII Input & Output

```
"seattle","new-york",50.00
"seattle","chicago",300.00
"san-diego","new-york",275.00
"san-diego","topeka",275.00
```

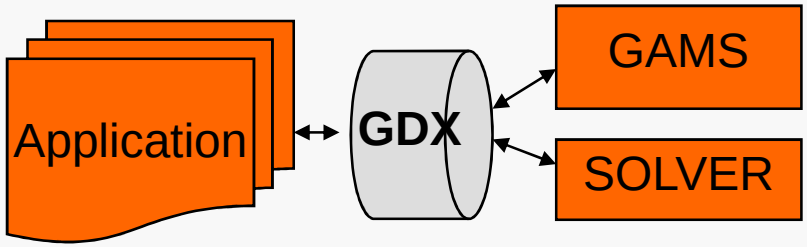
```
SEATTLE,NEW-YORK,2.5
SAN-DIEGO,NEW-YORK,2.5
SEATTLE,CHICAGO,1.7
SAN-DIEGO,CHICAGO,1.8
SEATTLE,TOPEKA,1.8
SAN-DIEGO,TOPEKA,1.4
```

```
city,new-york,chicago,topeka
seattle,2.5,1.7,1.8
san-diego,2.5,1.8,1.4
```

```
Shipped quantities between plants and markets
---------------------------------------------
Shipment from seattle    to new-york   in cases:      50.00
Shipment from seattle    to chicago    in cases:     300.00
Shipment from san-diego  to new-york   in cases:     275.00
Shipment from san-diego  to topeka     in cases:     275.00
```

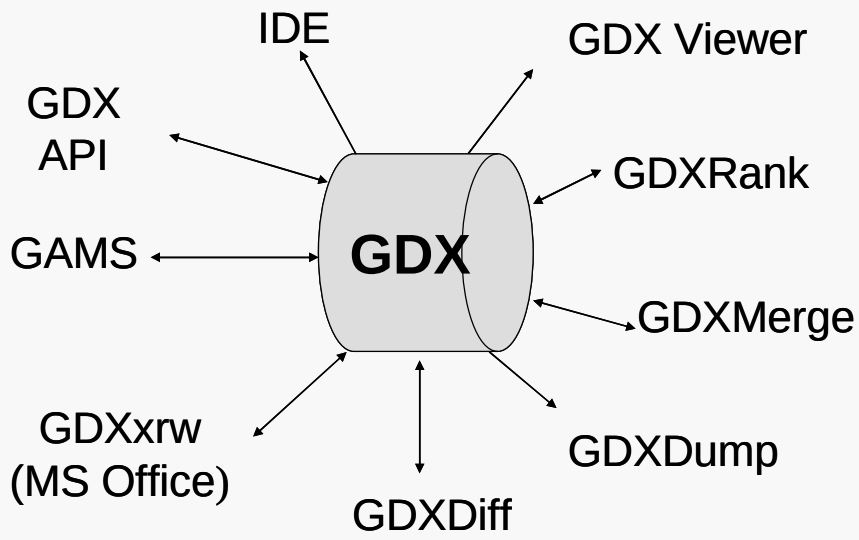
Gams Data eXchange

Binary Data Exchange



- Fast exchange of data
- Syntactical check on data before model starts
- Data Exchange at any stage (Compile and Run-time)
- Platform Independent
- Direct Excel connectivity
- General API
- Scenario Management Support
- Full Support of Batch Runs

GDX Tools



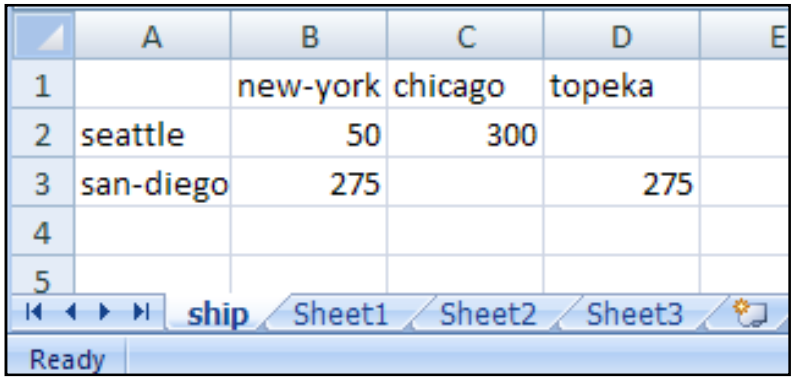
Using GDXXRW to read from Excel

	A	B	C	D	E	F	G	H
1	**Transportation**		New-York	Chicago	Topeka	Latitude	Longitude	
2	**Matrix**		NY	EL	KS			
3	Seattle	WA	2.5	1.7	1.8	47.45	122.3	
4	San-Diego	CA	2.5	1.8	1.4	32.82	117.13	
5								
6								
7								
8								

```
Parameter d(i,j) distance in thousands of miles;
$call GDXXRW dist.xls par=d rng=dist!A1 rdim=1 cdim=1
$if errorlevel 1 $abort "Problem with file dist.xls!"
$gdxin dist
$load d
```

Using GDXXRW to write to Excel

```
execute_unload 'ship' x;
execute 'GDXXRW ship.gdx var=x rng=ship!A1 rdim=1 cdim=1';
```



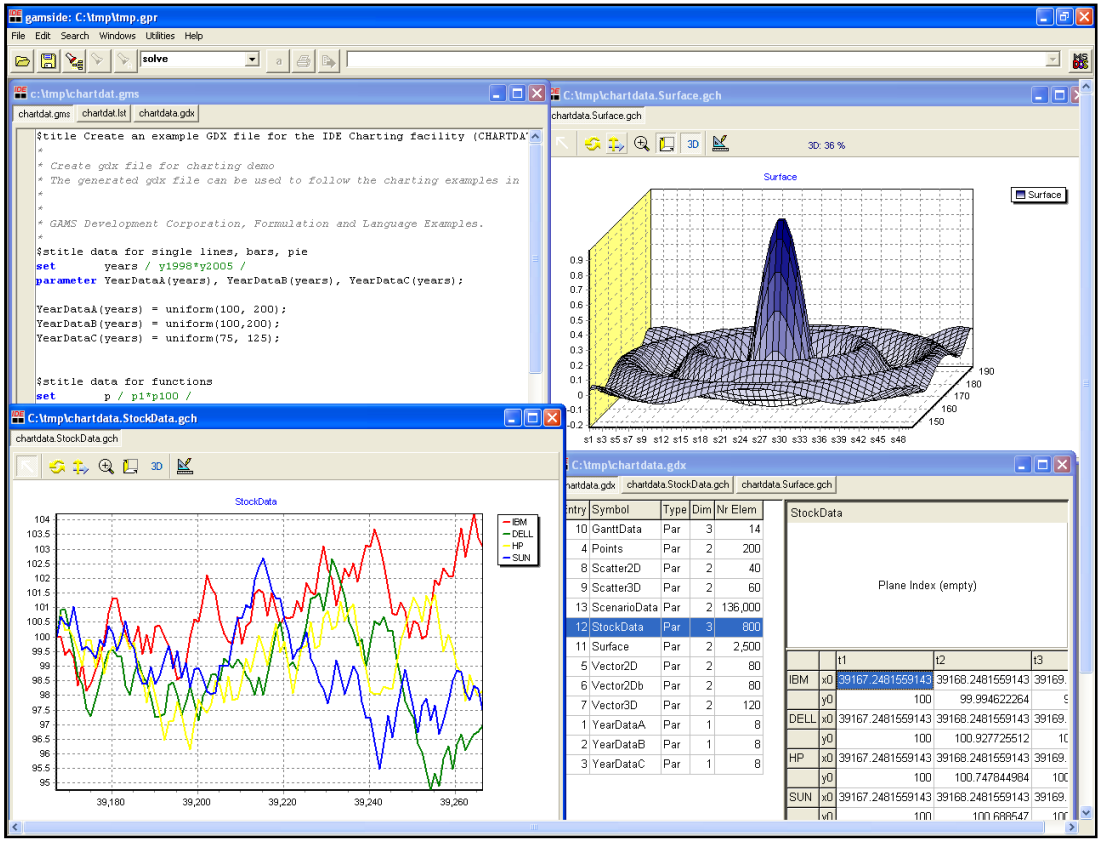
	A	B	C	D	E
1		new-york	chicago	topeka	
2	seattle	50	300		
3	san-diego	275		275	
4					
5					

ship | Sheet1 | Sheet2 | Sheet3

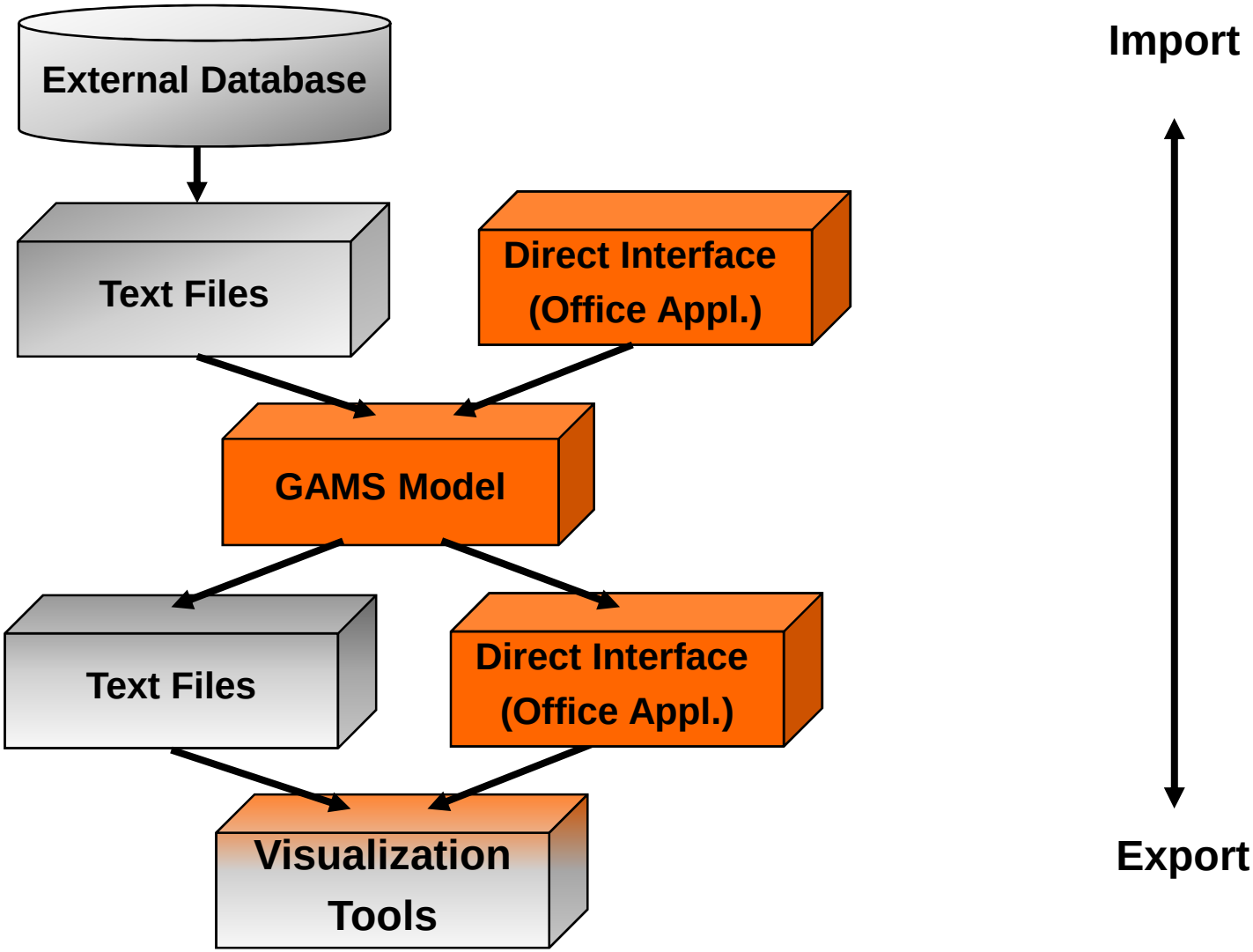
Ready

Hands-on! GDX and Tools

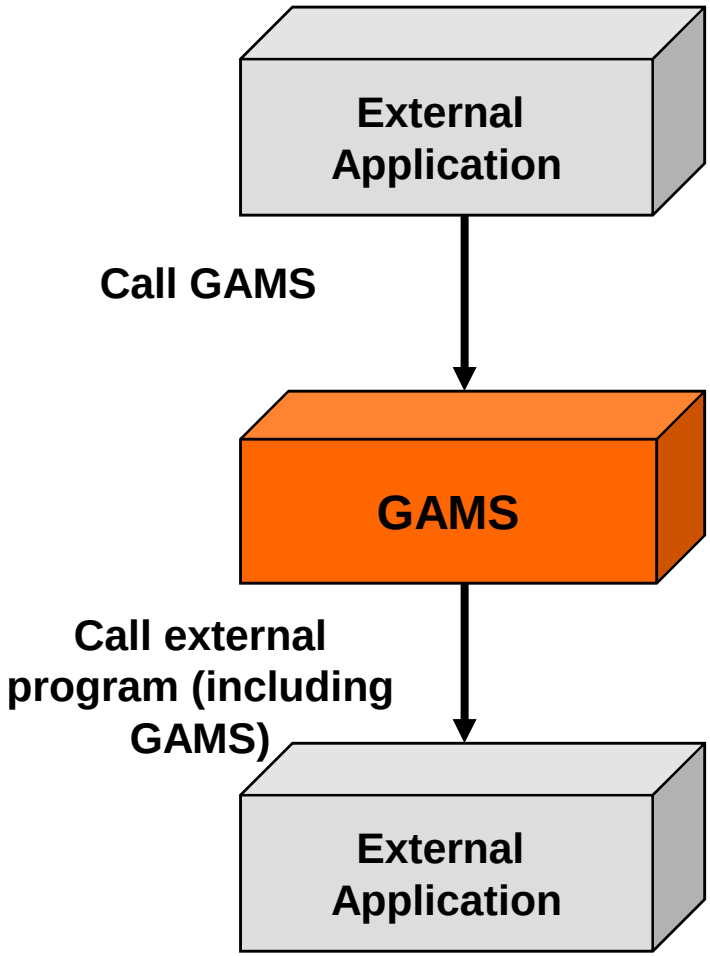
- Create GDX file
  - execute_unload
  - Gdx=filename
- GDX Viewer
  - Data cube
  - Export to Excel,…
  - Drag and drop
  - Search engine
- GDXdiff
- Charting Engine



GAMS in Control



Application in Control



Programming Language or other Application

Application

Hands-on! Sudoku

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22	c23	c24	c25
r1			12				21			11				7					3	17			9		24
r2					17	8		18			11						22				1	13	20		
r3	4	1	2	8	9				3				24	20			6							22	11
r4	21	22	24	23			4	10	5				9	18	1			15			3	8			
r5	11			7		24	6		2	23	17	4			12								15		
r6						17	9	21				15		19					18					16	14
r7				5		4	22	11		10				16	17			12		1	13	9	25		8
r8			6		3		18	1					14	21	7				9	23	19			2	
r9		9		17	8		15	25			12			4			2			11	20		21		
r10		13	7			23	3						20							10		18		4	22
r11	13		18		5	2							4			3				8		1		7	23
r12				16	23			7			1	25			5						24		14		
r13				11	25			12						23	21	20		14	4						
r14	8	12	20	19					23				22		11	24				6			17	10	
r15	14	2					8		19	25	6	16		3	9	11		5		12				20	15
r16	12	17						5		21	18		6			2	9			24	4		10		20
r17	2			1						3					25	19			21	22	16			24	
r18	20			24	16		10						17	1				23		5	18	25		3	
r19		8			14	25	17				24	9	19	5		6			20			11	23	1	
r20			11	25	6	20	1			7			16	14					10	15	17	12			21
r21	22	23				21		16				8			18	7		24				14	13		17
r22		7		15			20			6		24		2	14	13			11	3			5		25
r23	3	21		10		7	25	14	15	19				9		22		6			2				
r24	9					18	5				23	19	15		10			1					11		
r25		16			20	3		24	13	4				17						25		21	12	15	

Letters | Numbers

Solve | Clear solution

Calling GAMS from an Application

– Through ASCII files or using GDX API

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

Sources of GAMS Information

Download: http://download.gams-software.com/
Release Notes: http://www.gams.com/docs/release/release.htm
Contributed Documentation: http://www.gams.com/docs/contributed
Contributed Software: http://www.gams.com/contrib/contrib.htm
Presentations: http://www.gams.com/presentations
Workshops: http://www.gams.com/courses.htm

Bruce McCarl's Newsletter: http://www.gams.com/maillist/newsletter.htm
GAMS User Group: http://www.gams.com/maillist/gams_l.htm
GAMS Google Group: http://groups.google.de/group/gamsworld

Other relevant sites on the Web: http://www.gams.com/hotlinks.htm

Contacting GAMS

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