Object Oriented GAMS API using the example of .NET

Clemens Westphal
cwestphal@gams.com

GAMS Software GmbH
GAMS Development Corporation

www.gams.com

Rotterdam, September 5, 2013
Outline

• Introduction

• Development of a small GUI Application in C#
Calling GAMS from your Application

Creating Input for GAMS Model
→ Data handling using GDX API

Callout to GAMS
→ GAMS option settings using Option API
→ Starting GAMS using GAMS API

Reading Solution from GAMS Model
→ Data handling using GDX API
Low level APIs → Object Oriented API

- Low level APIs
  - GDX, OPT, GAMSX, GMO, …
  - High performance and flexibility
  - Automatically generated imperative APIs for several languages (C, Delphi, Java, Python, C#, …)

- Object Oriented GAMS API
  - Additional layer on top of the low level APIs
  - Object Oriented
  - Written by hand to meet the specific requirements of different Object Oriented languages
Features of the object oriented API

- No modeling capability. Model is still written in GAMS
- Prepare input data and retrieve results in a convenient way → GAMSDatabase
- Control GAMS execution → GAMSJob
- Seamless integration of GAMS into other programming environments
  → .NET, Java and Python APIs part of the current distribution at www.gams.com
Transport Application

- Scenario solves of the transportation problem (mutable scalar)

- Features:
  - Preparation of input data
  - Loading data from Access file
  - Solving multiple scenarios of a model
  - Displaying results

- Four implementation steps:
  1. Graphical User Interface
  2. Preparation of GAMS model
  3. Implementation of scenario solving using GAMSJob
  4. GAMSModelInstance for performance improvements
A Transportation Model

Seattle (350)
San Diego (600)
Chicago (300)
New York (325)
Topeka (275)
Summary

• Object Oriented API provides an additional abstraction layer of the low level GAMS APIs

• Powerful and convenient link to other programming languages

• .NET, Java and Python APIs are part of the current GAMS release available at www.gams.com. Many examples available:
  – Sequence of Transport examples
  – Cutstock, Warehouse, Benders Decomposition

• .NET/Mono and C++ under development
GAMS Talks at the OR 2013

- Thursday 9:00 – 10:30: Open-source Quality Assurance and Performance Analysis Tools (Michael Bussieck)

- Thursday 11:00 – 12:30: Recent Enhancements in GAMS (Lutz Westermann)

- Thursday 11:00 – 12:30: Object Oriented GAMS API: Java, Python and .NET (Clemens Westphal)
Contacting GAMS

Europe

GAMS Software GmbH
P.O. Box 40 59
50216 Frechen
Germany

Phone: +49 221 949 9170
Fax: +49 221 949 9171

info@gams.de

USA

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

Phone: +1 202 342 0180
Fax: +1 202 342 0181

support@gams.com

http://www.gams.com