

Distributed Remote Agents and
Global brOkers Network
(DRAGON)
for DSN and Missions

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Agenda

- Motivation/problem definition
- Approach
- Software architecture
- Capabilities
- Current developments
- Conclusion

Acknowledgement

- Sponsors: RAPSO, SPS, PTM for MSL (earlier version)
- Developers (part time):
 - Yeou-Fang Wang
 - John Baldwin
 - Luke Voss (APT)

Motivation / Problem Definition

- Single computation engine cluster for multiple users/platform/application/devices
 - Users: RAPSO, DSN scheduling, SPS, projects, spacecraft designers
 - Client platforms: Windows, Solaris/UNIX, Mac, Linux
 - Applications: Web browser, GUI apps, ...
 - Devices: Desk-top, lap-top, hand-held
- Application linkage / tool integration
- Centralized installation for algorithm changes

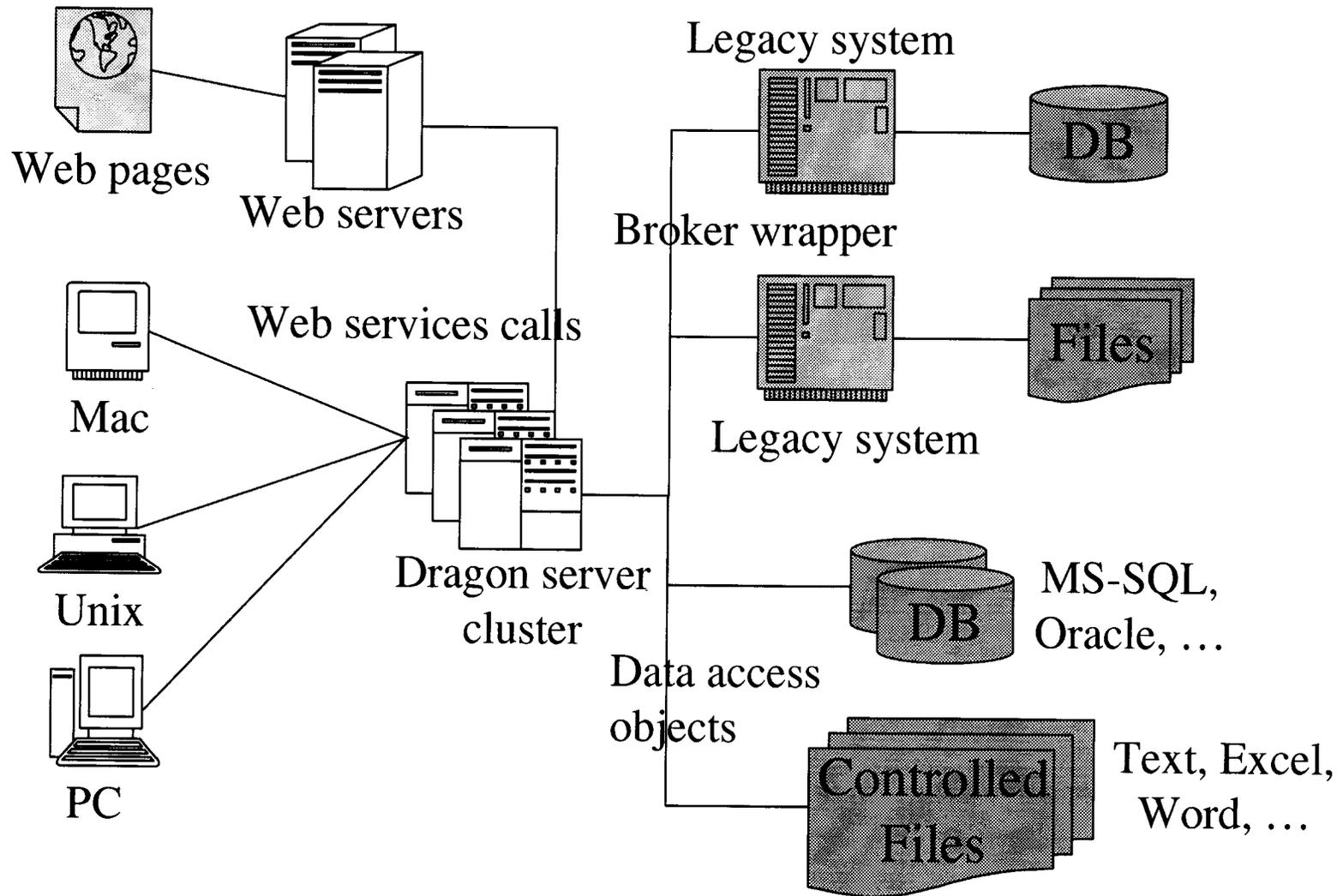
Approach

- Service-centric distributed system using Web services (vs. GUI-centric or database-centric)(info vs. data)
- Multi-tier
 - User/program interface
 - Computation engine / business logic
 - Data access
- Encapsulation: between tiers, objects, ...for min dependency.
- Namespaces:
 - Ground system: ground resource, forecast, scheduling
 - Project: mission, event, telecom, power,
- Secured Web services: HTTP/XML, standard, text
- Ownership – go to the right source for logic and data, no data stored locally

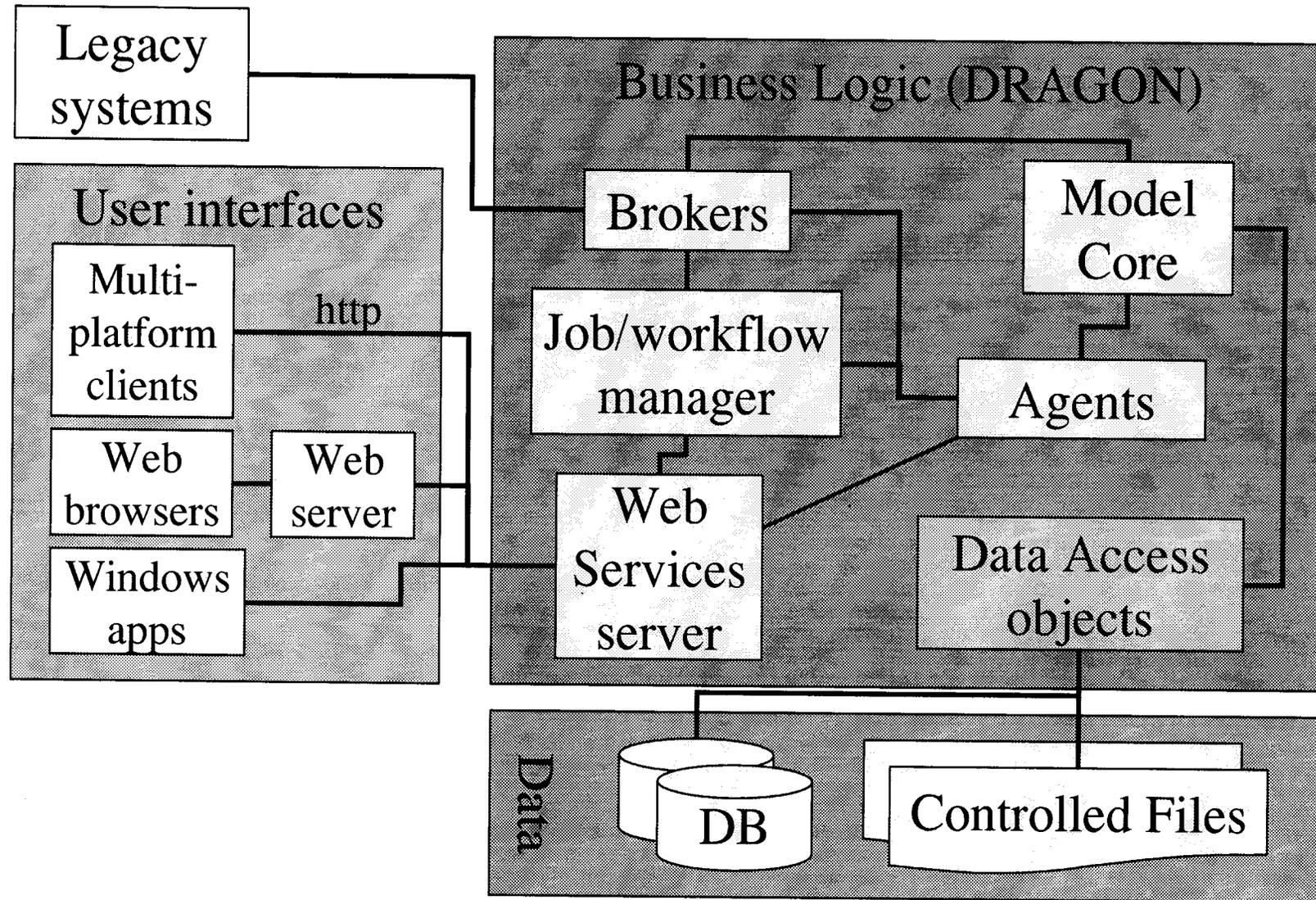
Agents & Brokers

- Agents: Intelligent decision makers
 - Expert in the field (e.g. Scheduler agent to generate schedule)
 - Possible learning capability
- Brokers: Connection to legacy software or possible hardware

Access Model



Software architecture



Current Implementation

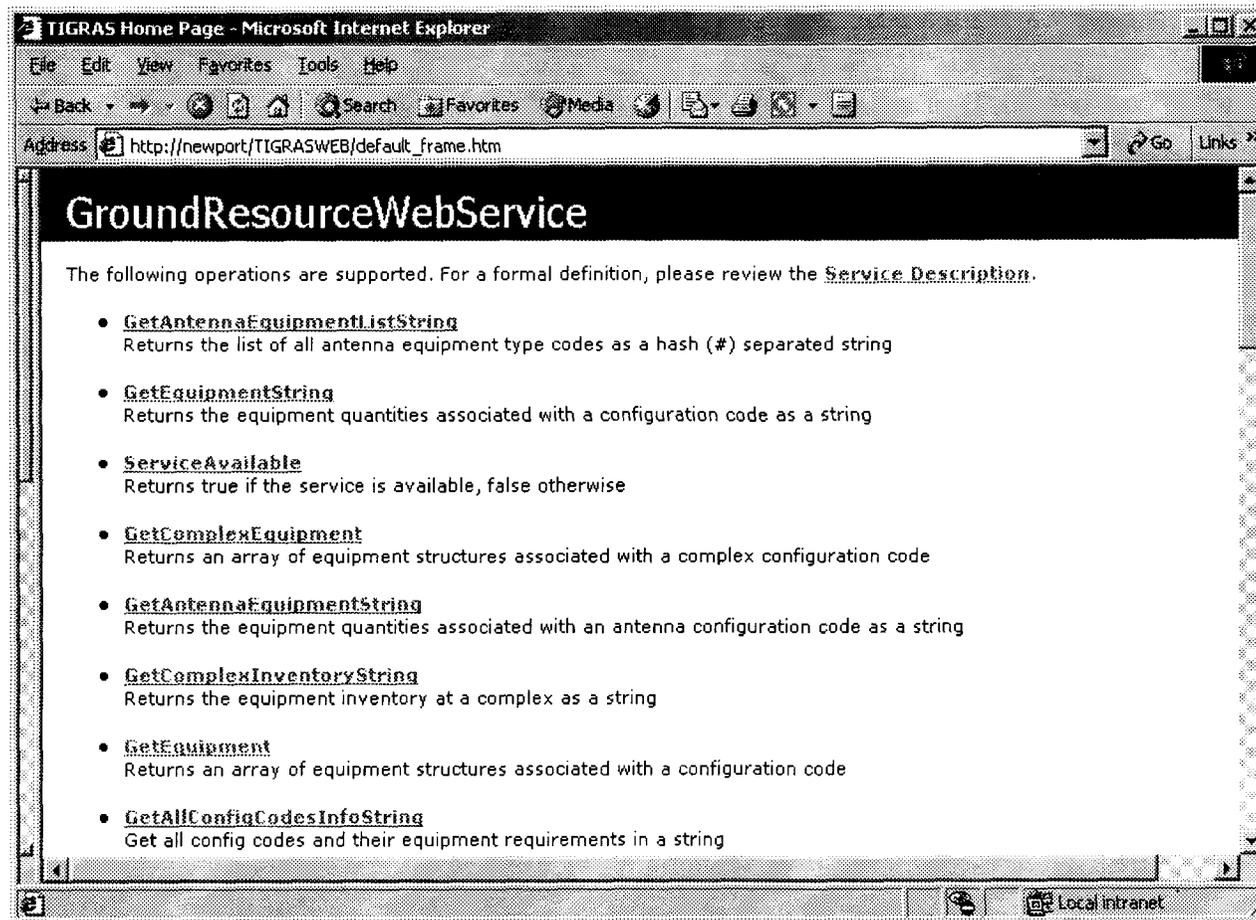
- Namespace: JPL.DRAGON
- The concept is platform-independent
- Current implementation is based Microsoft .NET using C#, CLR, and ASP.NET

Current Capability (JPL.DRAGON)

- Time: DST, week/year, current time
- Spacecraft: S/C number, names
- Viewperiod: combining VP data from forecast, project, NSS, ...
- Ground resource: config code, equipment, inventory, ...
- Scheduling: NSS real-time, planning, conflict checking (partial)
- Excel: get value from Excel, compute in Excel

Sample:

Ground Resource Information



TIGRAS Home Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print

Address http://newport/TIGRASWEB/default_frame.htm Go Links

GroundResourceWebService

The following operations are supported. For a formal definition, please review the [Service Description](#).

- **[GetAntennaEquipmentListString](#)**
Returns the list of all antenna equipment type codes as a hash (#) separated string
- **[GetEquipmentString](#)**
Returns the equipment quantities associated with a configuration code as a string
- **[ServiceAvailable](#)**
Returns true if the service is available, false otherwise
- **[GetComplexEquipment](#)**
Returns an array of equipment structures associated with a complex configuration code
- **[GetAntennaEquipmentString](#)**
Returns the equipment quantities associated with an antenna configuration code as a string
- **[GetComplexInventoryString](#)**
Returns the equipment inventory at a complex as a string
- **[GetEquipment](#)**
Returns an array of equipment structures associated with a configuration code
- **[GetAllConfigCodesInfoString](#)**
Get all config codes and their equipment requirements in a string

Local intranet

Schedule viewing

10/15/2002
(NY42 Y2002)
(D288 Tuesday)

03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10

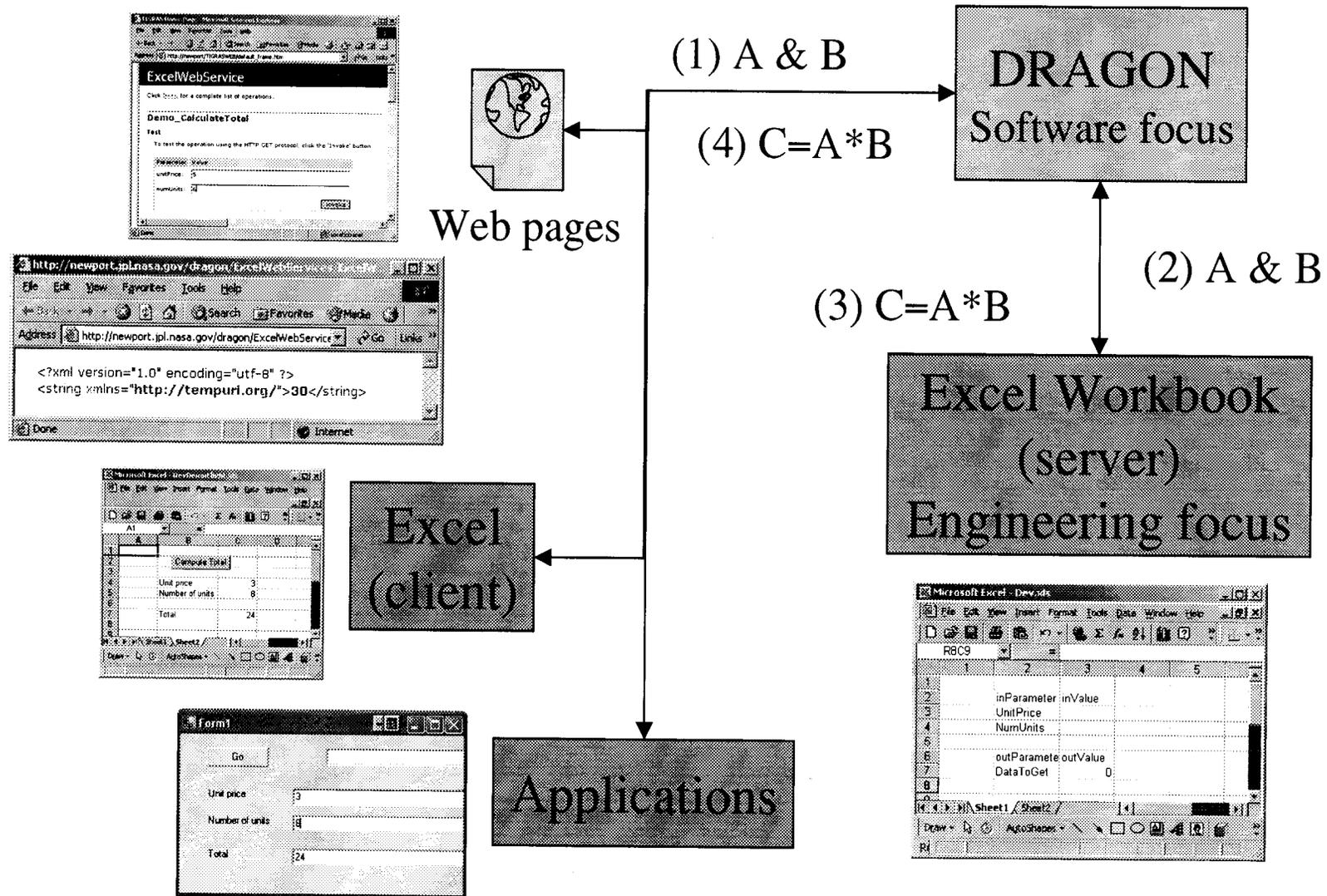
DSS-10
DSS-13
DSS-14
DSS-15
DSS-16
DSS-24

288	GTL	27	0630	0810	025	010	TR DUMP 131S	3181	C033PB	C	1A1
288	POLR	46	0730	0930	040	010	PB ONLY	3609	C00BPB	A	1A1
288	DSN	26	1050	1415	000	000	ULYS NSP PIT		NONE	-	1A3
288	SOHO	66	1200	1615	025	010	VC4 SSR DUMP	2511	C00EN0	B	1A1
288	VGR1	65	1200	1735	030	015	TKG PASS	9196	H004		1A1
288	MGS	25	1210	2210	045	015	TKG PASS N/R	2172	F714		1A1

The Web page updates every few minutes.

Same GUI code for both Web browser and windows app.

Excel Access -- multiplication



Current developments

- Security (authentication & authorization)
 - SOAP header (user name & password)
 - SSL
 - Role-based
 - Individual function level (rather than Web service level)
 - Excel security: macro, document check-in/check-out
- Admin: user accounts, roles, function access, status, abort
- Workflow: calling sequence, notification, alerting
- Increasing function collection

Conclusion

- Service-centric servers for multiple usages
- Remote access through Web services (SOAP/XML)
- Local application access through library/DLL
- GUI components for assembly
- Welcome others to join JPL namespace development (JPL.NAV, JPL.IMAGE, ...)