

Product Lines that supply other Product Lines: A Service-Oriented Approach

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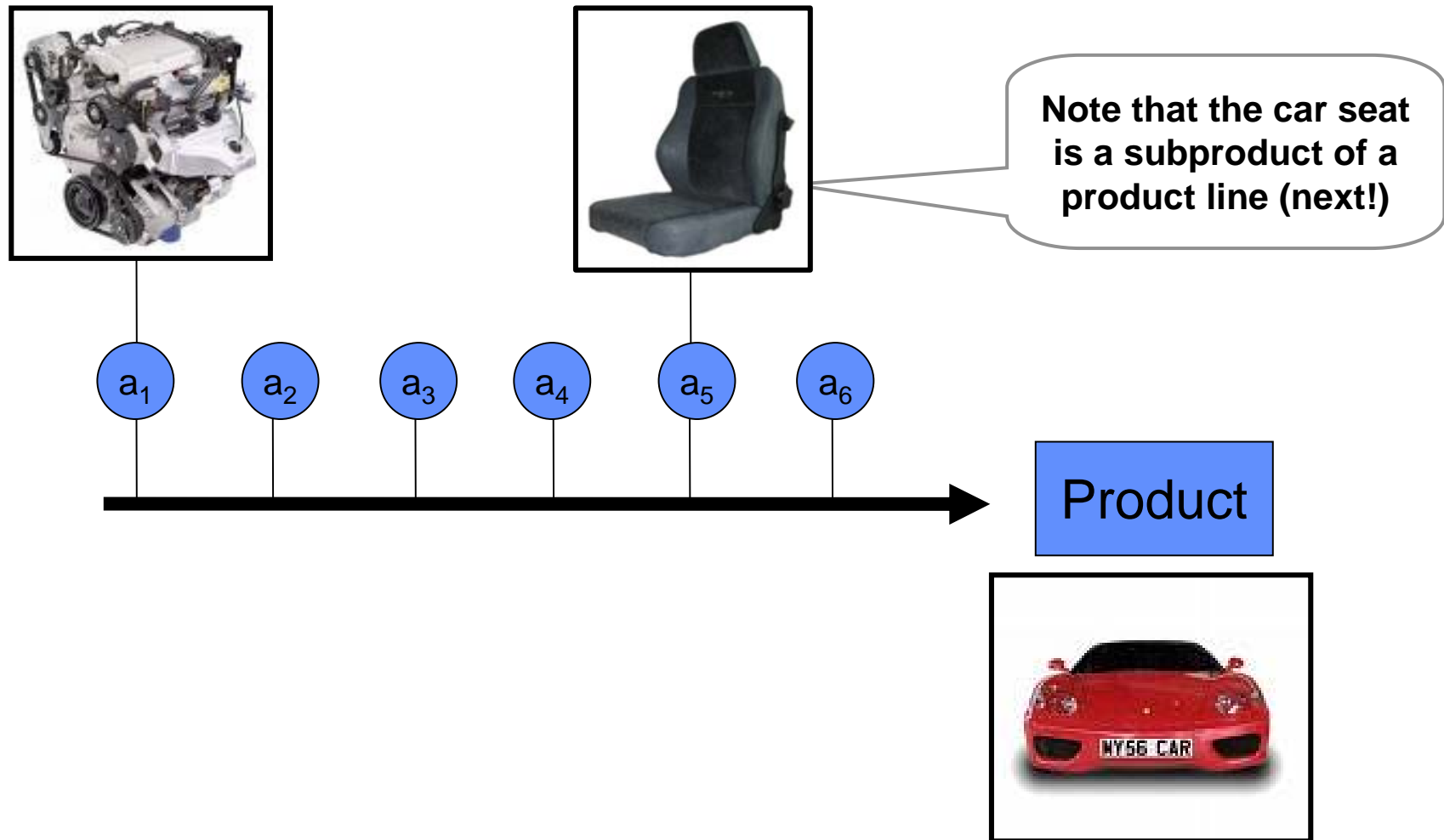
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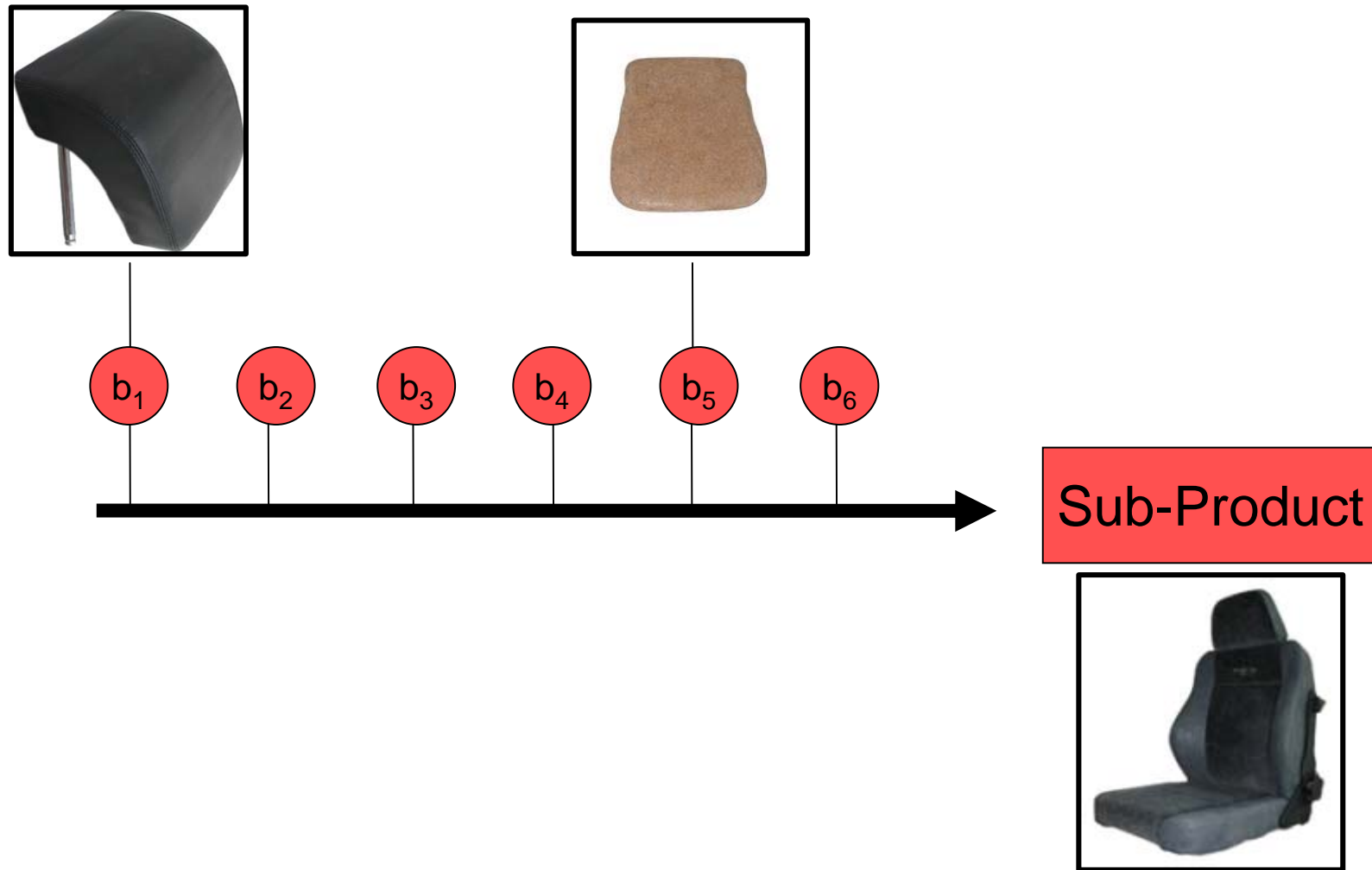
Overview

- In industry, product-lines commonly use parts of other product lines
- So far, this situation is unlikely for software product lines
- The problem is the combination of different parts produced by different product lines
 - ◆ We propose a service-oriented architecture to do so,
 - ◆ in which product lines are regarded as services,
 - ◆ which are consumed by service-oriented product lines
- We illustrate these ideas with an example, but we believe that much more work is needed

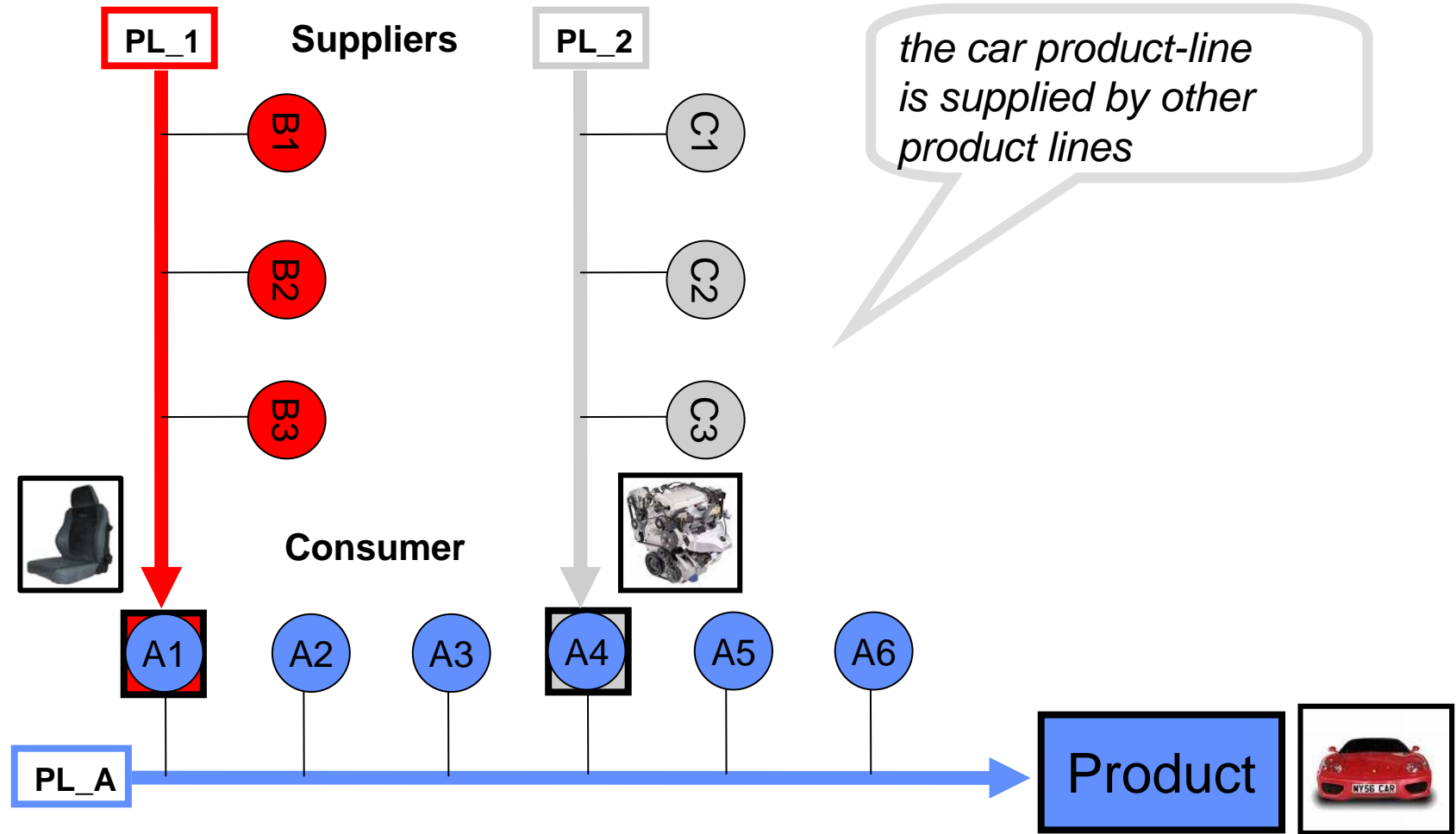
An Introductory Example: car assembly line



An Introductory Example: car seat assembly line



An Introductory Example: product lines that supply other product lines



A Portal / Portlet scenario

Portals & Portlets

- A **Portal** is a Web application that provides centralized access to a variety of services
- Services are often offered by 3rd party components called Portlets

- ◆ are presentation-oriented web services
- ◆ business logic *and* web user interface

The screenshot shows a WebSphere Portal interface with several portlets. An orange callout box labeled 'a Portlet' points to the 'My Weather' portlet. A red callout box labeled 'another Portlet' points to the 'My Stocks' portlet. A pink callout box labeled 'more Portlets' points to the 'My News' and 'Financial Services' portlets.

My Weather
 Tuesday, August 2, 2005 7:18:00 AM GMT

Raleigh, North Carolina	70°	70°/92°
Stuttgart, Germany	59°	48°/66°
Beijing (Peking), China	88°	74°/90°
Tokyo, Japan	82°	75°/87°
San Francisco, California	57°	56°/70°

My Stocks
 Monday, August 1, 2005 4:01:00

IBM	83.4		
\$COMPO	2,195.3		
\$DJI	10,623.15		
\$SPX	1,235.35	1.17	0.09%

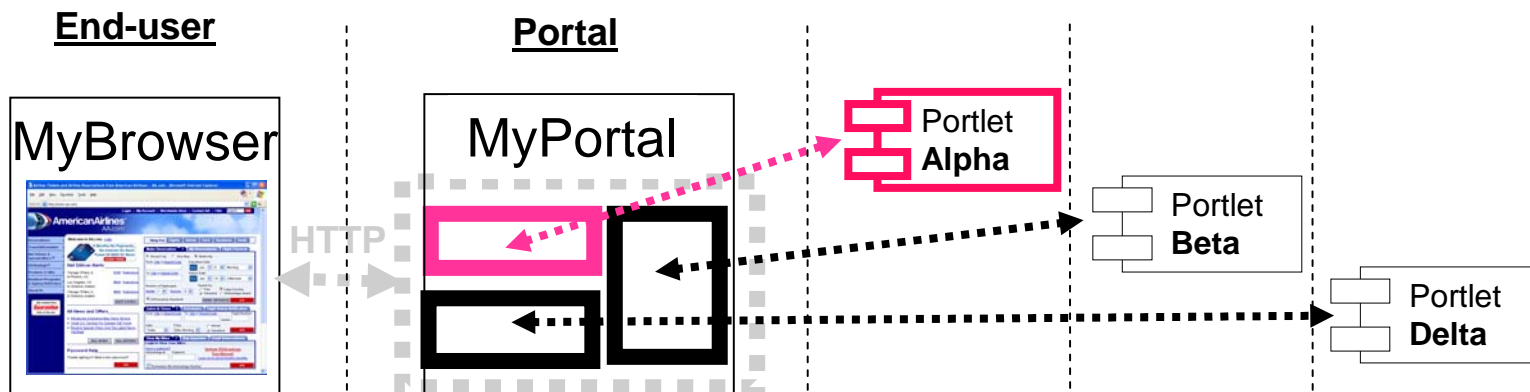
Data delayed at least 20 minutes.

My News
 Financial Services
 Stocks end mixed
 Charles Schwab board
 Principal Financial doubles

Bookmarks
 WebSphere Portal
 WebSphere Portal
 WebSphere Portal
 WebSphere Portal
 WebSphere Portal
 WebSphere Portal

Portal Architecture

- End-user accesses Portal with web browser
- Portal aggregates different portlets
- Portlets provide business logic and representation



Scenario: Portlet Product Lines

*Different portals demand similar **portlets** that overlap in functionality*

Portlet_A_1

Portlet
FlightBookingPortlet

Flight Booking Portlet - Search (1)
Para comprobar disponibilidad y tarifas, dinos cuando y como quieres volar

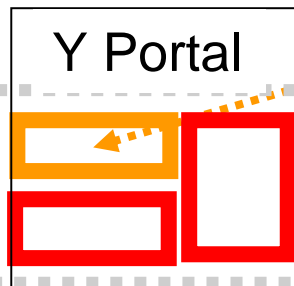
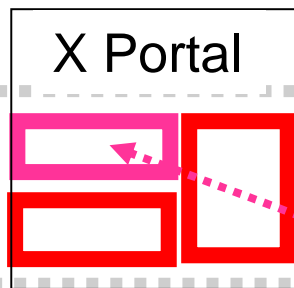
Desde | Origin A | Destination

Dia de Salida | 01 Mes | June Año | 2005

Dia de Vuelta | No. Mes | Just one way Año | 2005

Adultos | 01

MyBrowser



*Different customers demand similar **portals** that overlap in functionality*

Portlet
FlightBookingPortlet

[Hotels & Car Hire](#) [Special offers](#)

Flight Booking Portlet - Search (1)
To check availability and fares, simply tell us where you want to fly and when

From | Bilbao To | New York - JFK

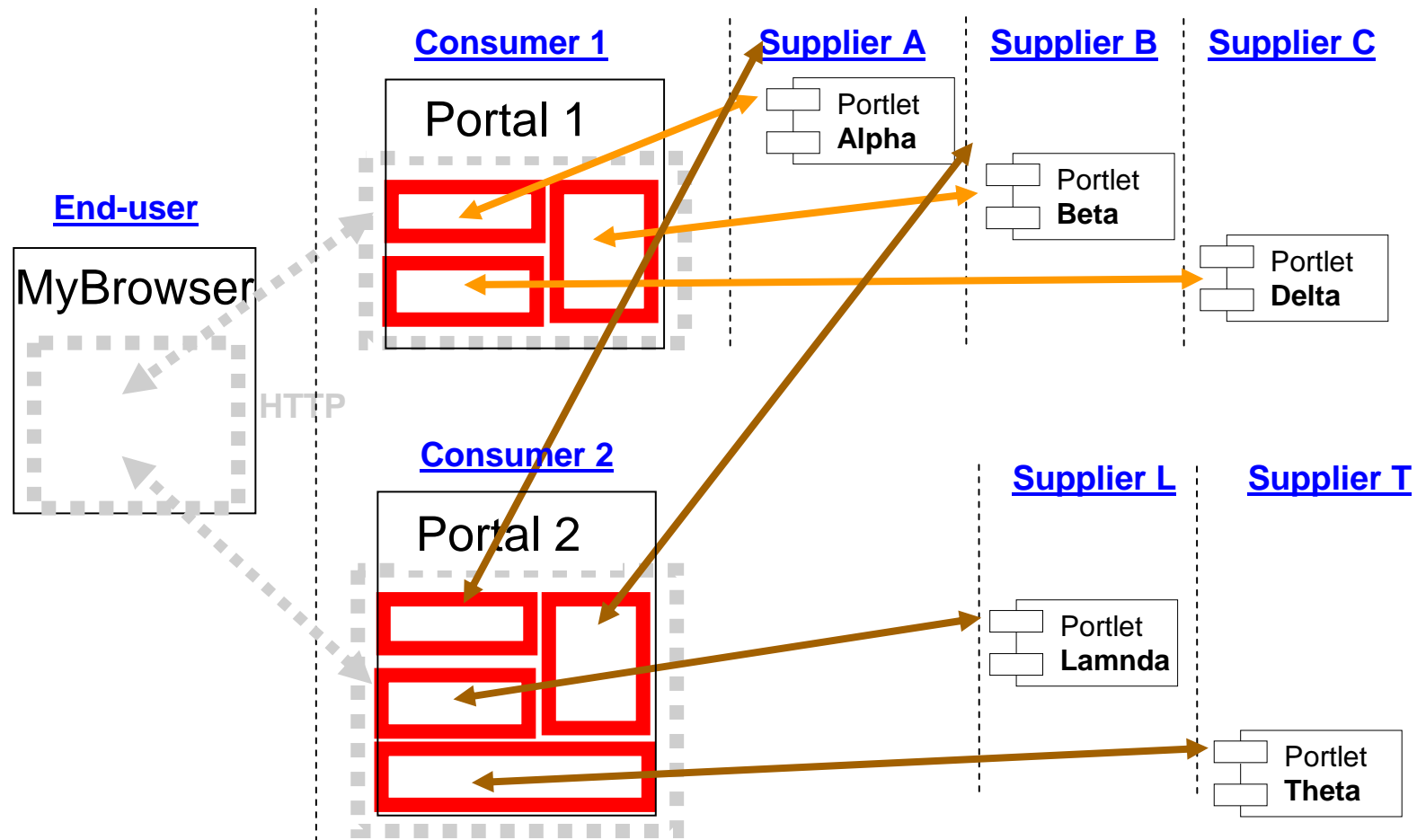
Departure Day | 10 Month | December Year | 2006

Return Day | 24 Month | December Year | 2006

Adults | 02

Portlet_A_2

Scale

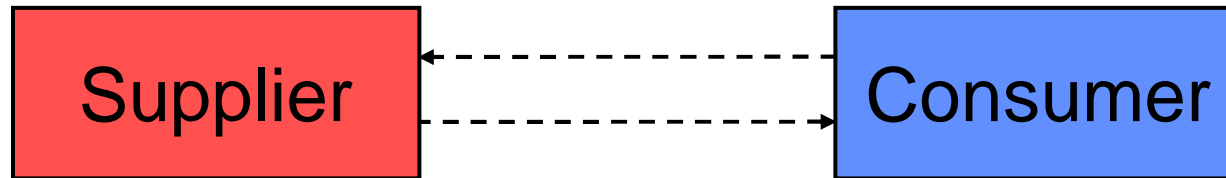


Implementing Product Lines of Product Lines

- Current solutions (e.g., software populations) require manual integration of individual supplied products.
- Supplying product lines can come from different vendors
- How can a software product line automatically request and consume a product from another product line?
- Can we automate registration, consumption and production?
- Our proposal
use SOA as infrastructure: *Service Oriented Product Lines*

Service Oriented Product Lines?

Supplier & Consumer



- A **supplier** is a product-line that supply products to other product lines (e.g., travel portlet product line)
 - ◆ Descriptive info (registration purposes)
 - ◆ Product info (which features are offered to distinguish product functionality)
 - ◆ Production interface (how is the product ordered, delivered, etc)
- A **consumer** is a product-line that consumes products from other product lines (e.g., research portal product line)
- Operation involves registration and consumption (based on existing SOA standardization efforts & tooling)

Discussion

- How to ensure consistency, e.g., when propagating features (requirements) over different SPLs?
- How can we ensure products from supplying SPLs are provided in time for a production schedule?
- Can we use or learn from concepts like BPEL for orchestration?
- Can we use service oriented product lines to refactor one product line into several smaller supplying product lines to separate concerns?
- Can we build a market for SPLs that can supply products to other SPLs?

Conclusions

- Product lines that supply other product lines appear frequently in industry
- Can we confer this concept on software product lines?
 - ◆ We believe that SOA is a powerful paradigm to do so
 - ◆ We present an illustrative example and its scenario
 - ◆ We sketch initial ideas to implement it (using SOA)
- Further work is needed to assess our approach
 - ◆ We need more work to create the infrastructure to make this really a viable approach with models, tools, etc.

Service Oriented Architectures and Product Lines - What is the Connection?

- We would say that SOA techniques can be used as infrastructure to build more complex SPL systems.
- Our longstanding envision is to facilitate the emergence of a concurrent market where atomic products from supplier product lines can be automatically integrated into a larger product line.

Thank you!

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