WaveMarket – A Case Study in Location Base Services and Location Data Processing

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Outline

- Introduction to WaveMarket
- LBS Value Chain
- Platform Verticals
  - Spatial Data Processing
  - Efficient Routing
  - Map Rendering for Mass Market Devices
  - Mobile Advertising
- Q&A

LBS Value Chain

A-GPS Chipset	Cellular Carrier	LBS PDE	GIS	LBS Platform	Mobile Apps	Content
• Qualcomm	• SK Telecom	• Nokia	• deCarta	• WaveMarket	• WaveMarket	• CitySearch
• SiRF	• KDDI	• Ericsson	•TeleAtlas	• Webraska	• Telenav	• Zagat
• Global Locate	• Bell Mobility	• TCS	• Navteq	• Autodesk	• Garmin	• Lonely Planet
	• Sprint/Nextel	• Redknee	• Zenrin	• LocatioNet	• MapQuest	• MSN
	• Vivo	• Openwave	• Maplink			

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LBS Applications

- Navigation
- Local search
- Family safety
- Asset tracking
- Fleet management
- Celebrity sightings
- Traffic and weather
- Real estate
- Fitness
- Industrial workflow
- Public safety
- Dating

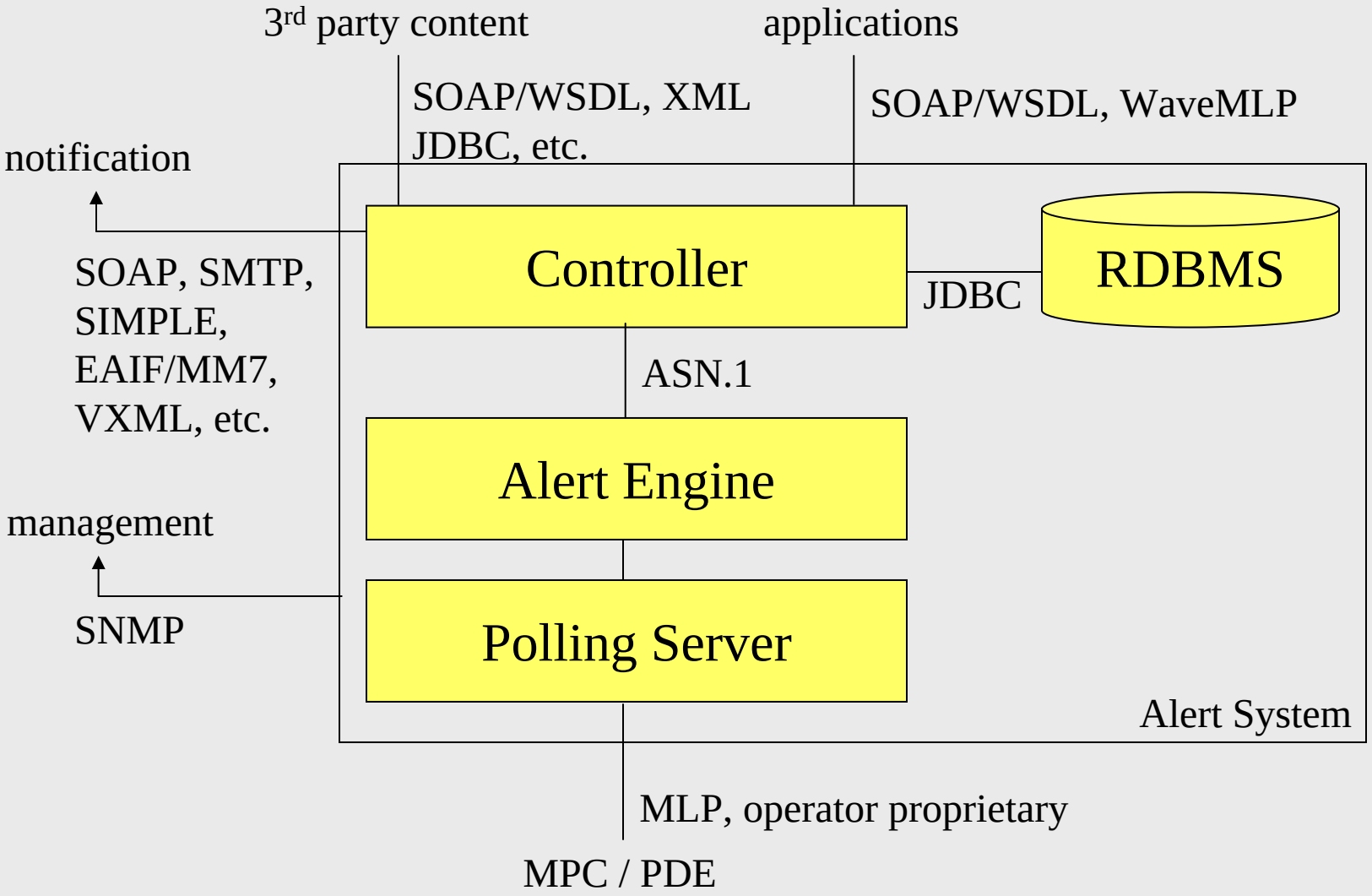
Spatial Processing Overview

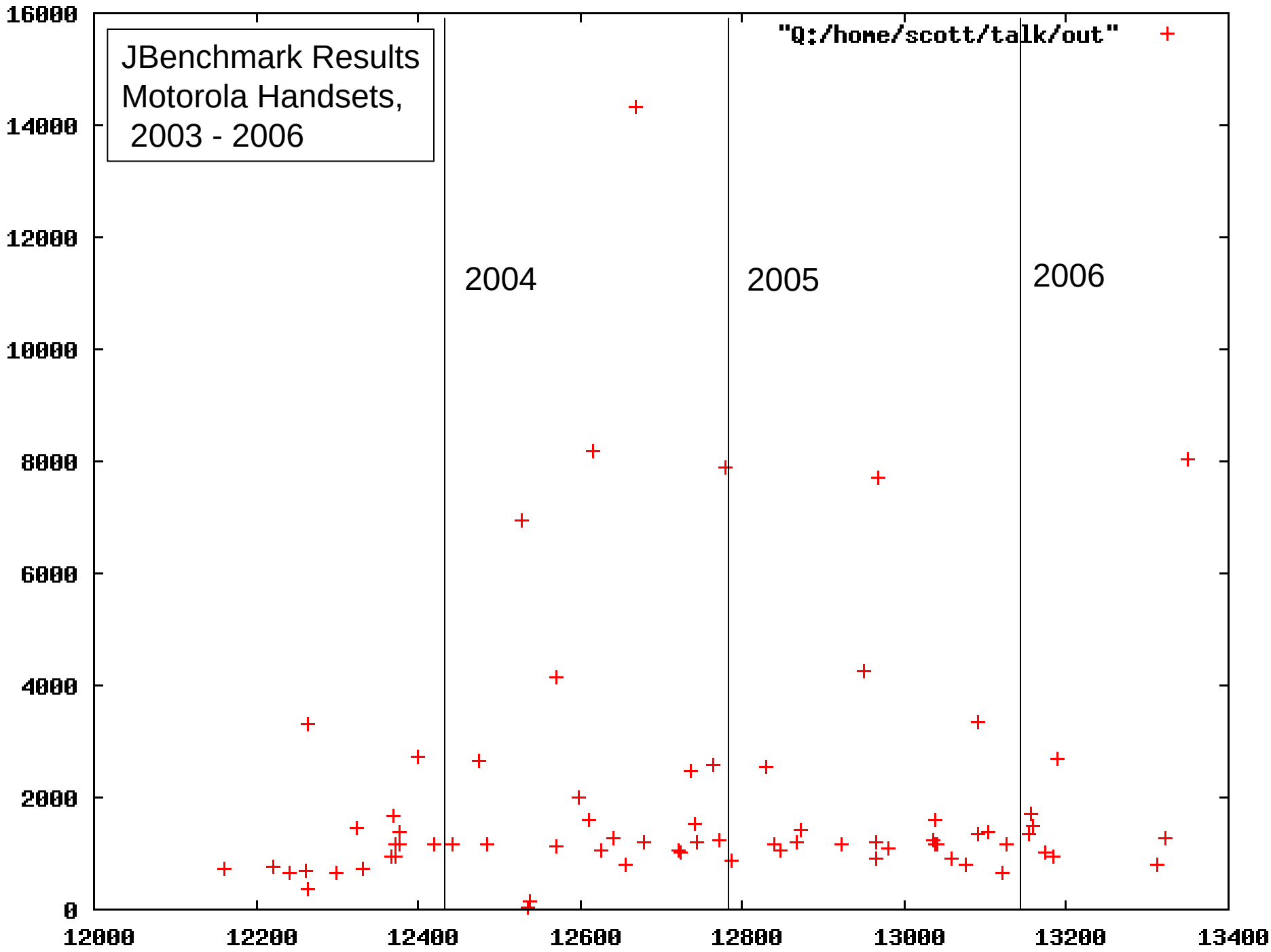
- GIS Primitives
- Spatial Indexing / Access Methods
- Spatial (and Spatio-temporal) Triggers
- Routing and Distance Estimation
- Turn-by-turn Navigation
- Traffic Estimation

Spatial Trigger System

- Expert System
- Location-centric rule language
- High efficiency
- Dynamic (minimize location usage)
- Extensible (declarative not a requirement)
- Similar to data warehouse pub-sub model

WaveAlert – Logical Diagram



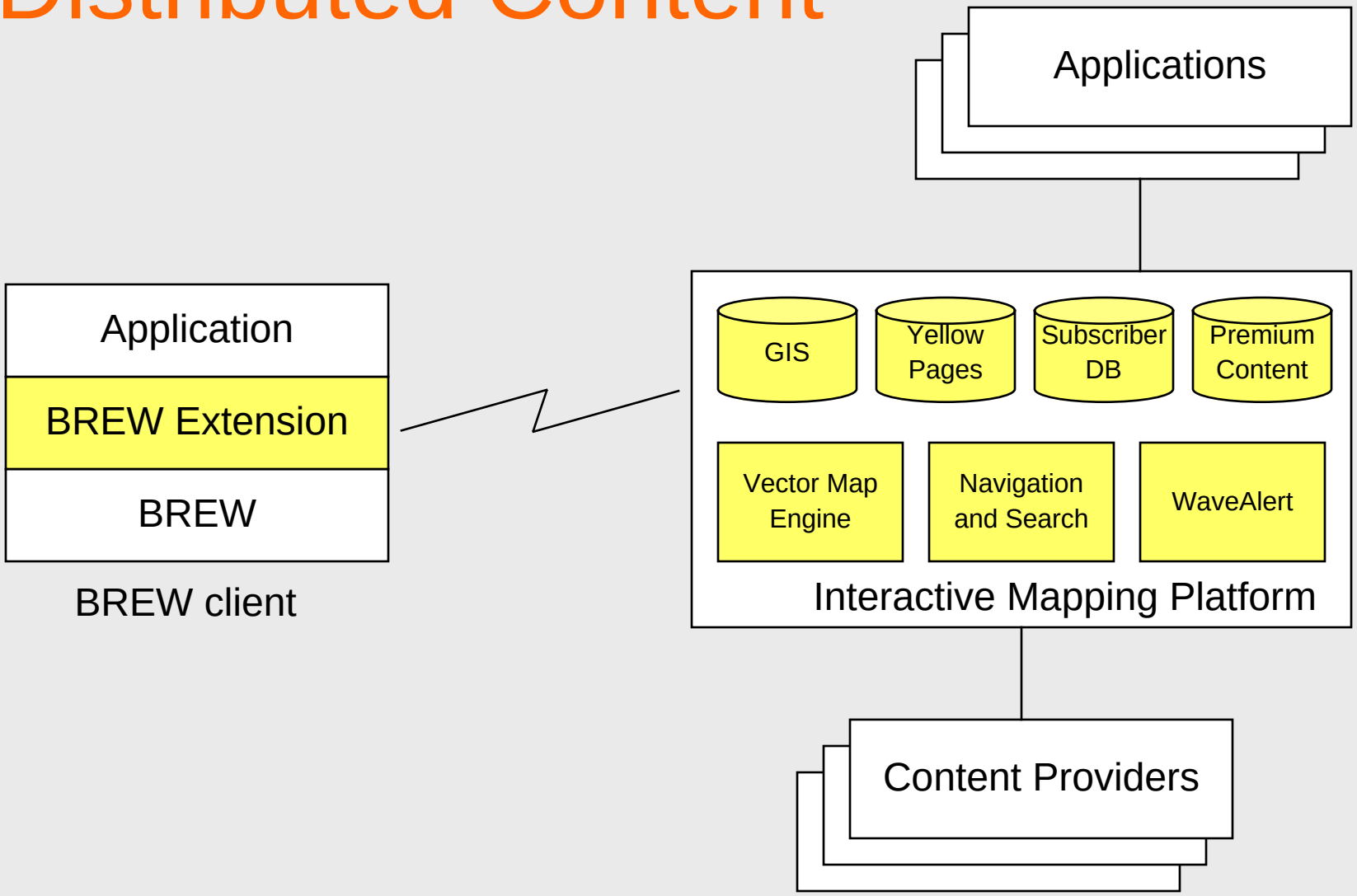

JBenchmark Results
Motorola Handsets,
2003 - 2006
"Q:/home/scott/talk/out"
2004
2005
2006
16000
14000
12000
10000
8000
6000
4000
2000
0
12000
12200
12400
12600
12800
13000
13200
13400

Mapping on Mobile

- Bandwidth and compression
- Rendering challenges
- Tiling and interaction models
- Custom UI elements
- Distributed content and API

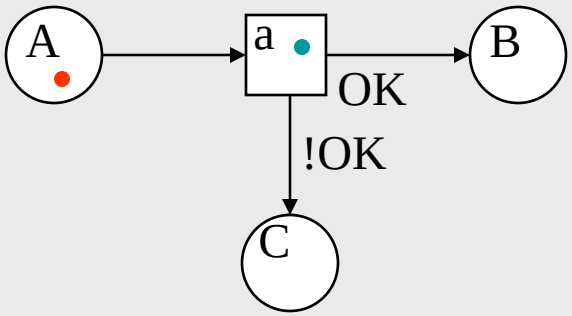
Custom UI Elements

Distributed Content



Workflow and Petri Nets

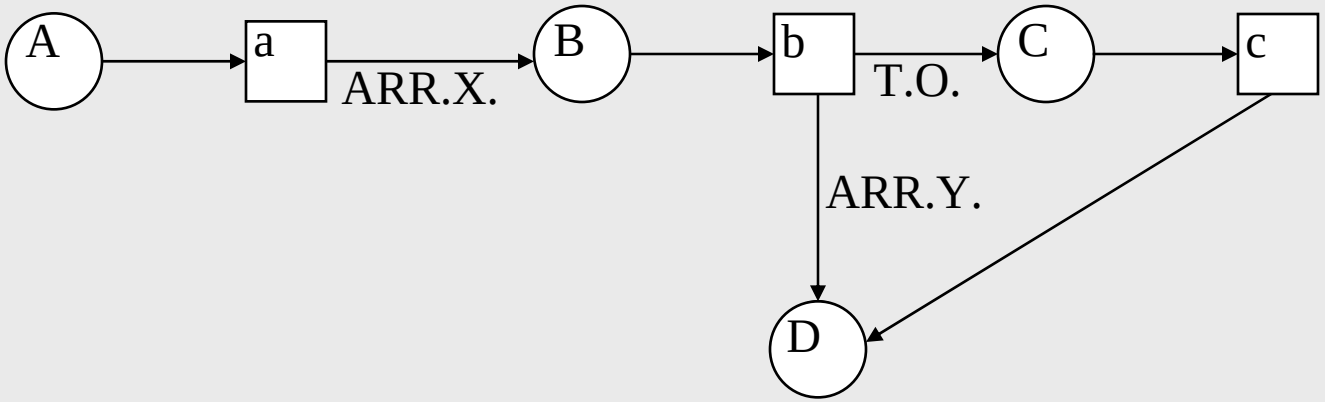
- The abstraction of a workflow definition is a *case type*.
- An instance of a case type is a *case*.
- Case types are composed of *tasks* and connected by *routing constructs*.
- In a case, a task can be in one of two states: it is a *work item* if it is ready to be processed, and an *activity* if it is in progress.



In the language of Petri nets, “a” is a task. For the orange case, task “a” is a work item (as it is ready to be processed by task “a”) and is in place “A”, and for the blue case, task “a” is an activity.

Example: Delivery Delay

Problem: Send notification if delivery at “Y” occurs more than 90 minutes after pickup at “X”.



In general, we will model events as the outcomes of transitions. Ordinarily, when a case is consumed by a task, one or more alerts will be registered, and if/when the alert fires the task is complete.

In this example, three alerts are defined: “ARR.X.” (arrive at “X”), “ARR.Y” and “T.O.” (timeout). These alerts are set when consumed by tasks “a” and “b”. Task “c” represents the alarm notification, and place “D” is the end.

Questions?

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