



INFINITY: A Generic Platform for Application
Development and Information Sharing on Mobile Devices

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work done at IBM Almaden Research Center



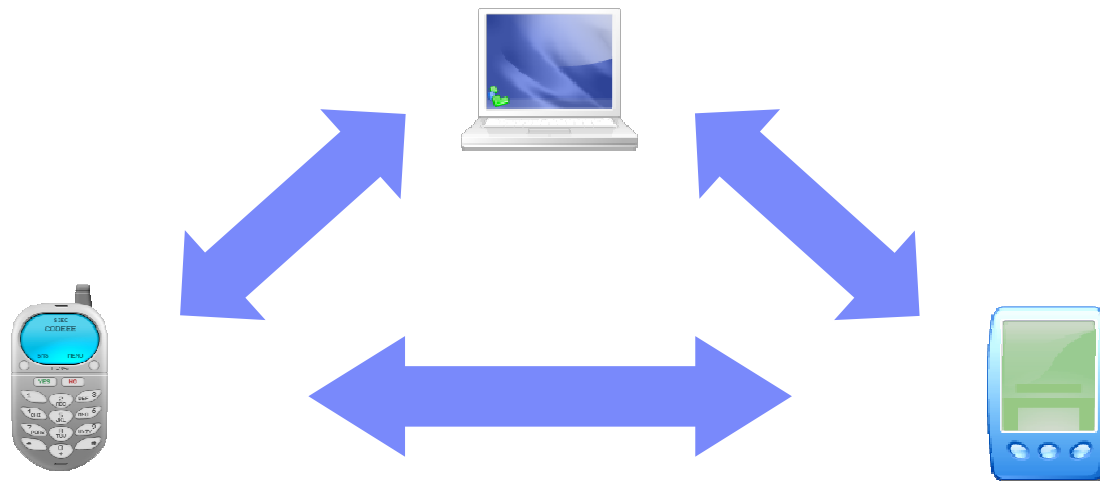
Mobile Data Landscape

- Mobile data sources are truly ubiquitous today
- Very heterogeneous landscape:
 - Different hardware platforms
 - Different OS and software environment
 - Mixed communication options



Mobile Data Sharing Requirements

- Ad-hoc
- Device-independent
- Combine own data and that of others
- Share also applications
- Protect privacy



Overview

- **Related work**
- System architecture and components
 - Runtime Engine
 - Communication module
 - Query processor
 - Privacy enforcement
- Prototype and example application
- Conclusion and outlook



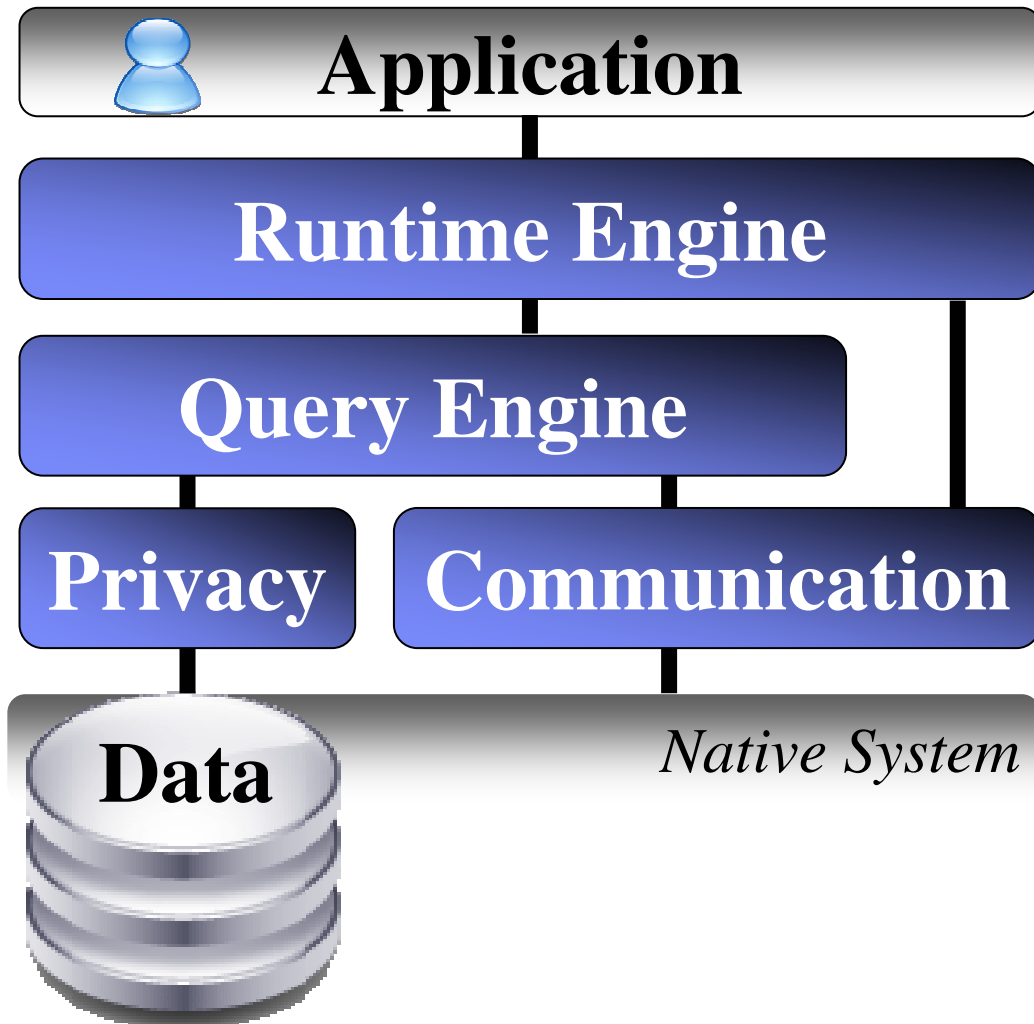
Related Work

- CarNet (Morris et al.): specialized hardware, restricted application, no privacy for shared data
- P2P systems (e.g. CHORD, PIER): usually rely on stable infrastructure and central services; no application sharing
- Sensor database systems, web service platforms, specialized mobile applications platforms: data consolidated in centralized and global repository

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INFINITY Architecture





Runtime Engine

- Webservice-like structure: listens for HTTP requests at local port
- Applications are written in HTML and JavaScript and run inside the local web browser
- Provides query and data presentation services to applications
- Applications are accompanied by a machine-readable description (XML)
- Packages and sends applications across devices
- Only allows application to issue the queries specified

Communication Module

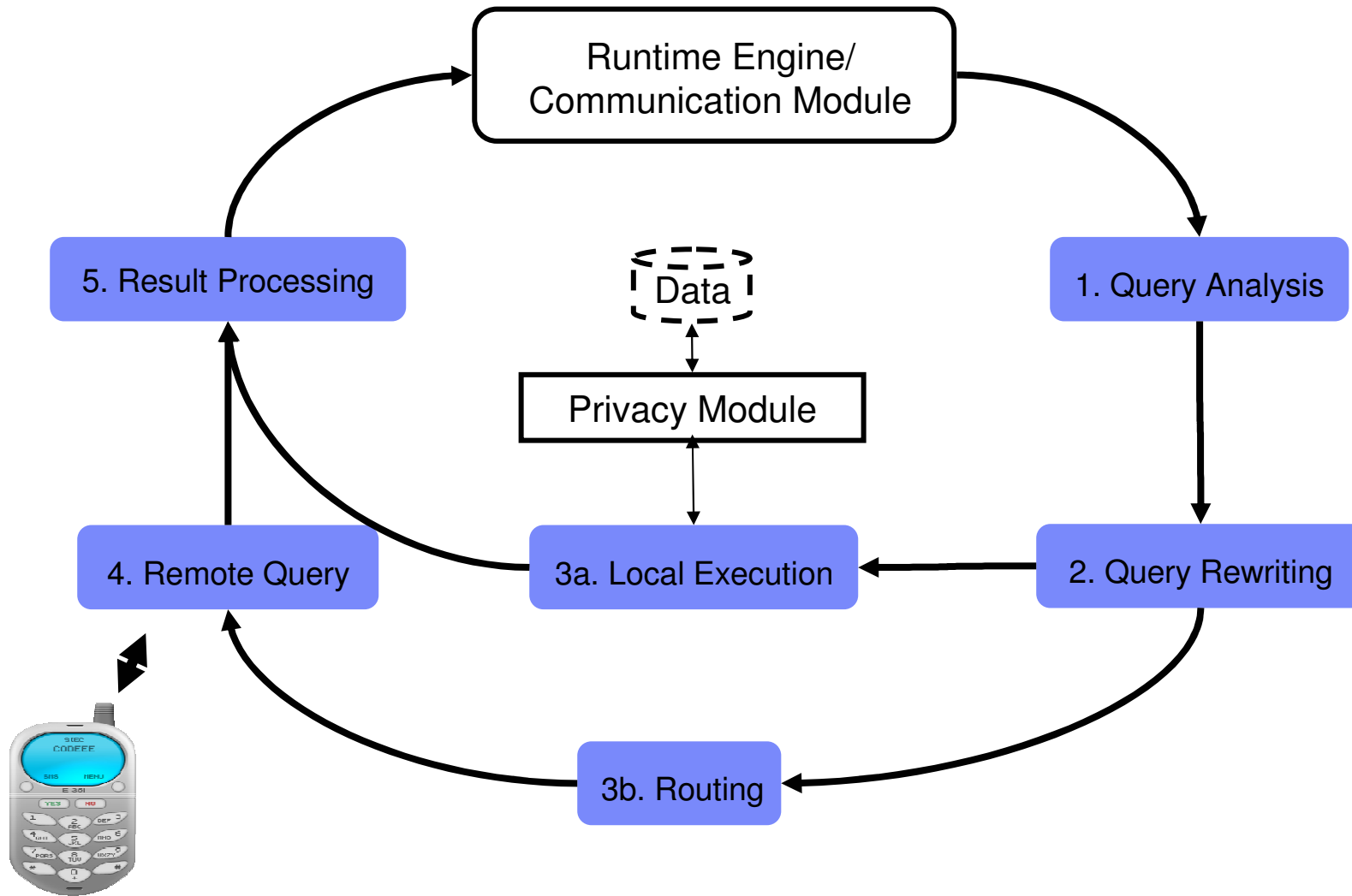
- Provides information exchange capabilities
- Resource discovery and monitoring
- Device independent data format
- Choice of communication channel
- Routes data to query or runtime engine



Query Engine

- SQL-like language
- Receives queries from communication module or runtime engine
- Query splitting and routing
- Local execution through privacy layer
- Presentation of results
- Global schema
- Local extensions of the schema

Query Processing



Privacy Enforcement

- Negative base policy: by default nothing is disclosed
- Rewrites queries so that privacy policy is enforced (like HDB)
- Single access point to local data
- Granularity of rules: what data by whom for what purpose under which condition

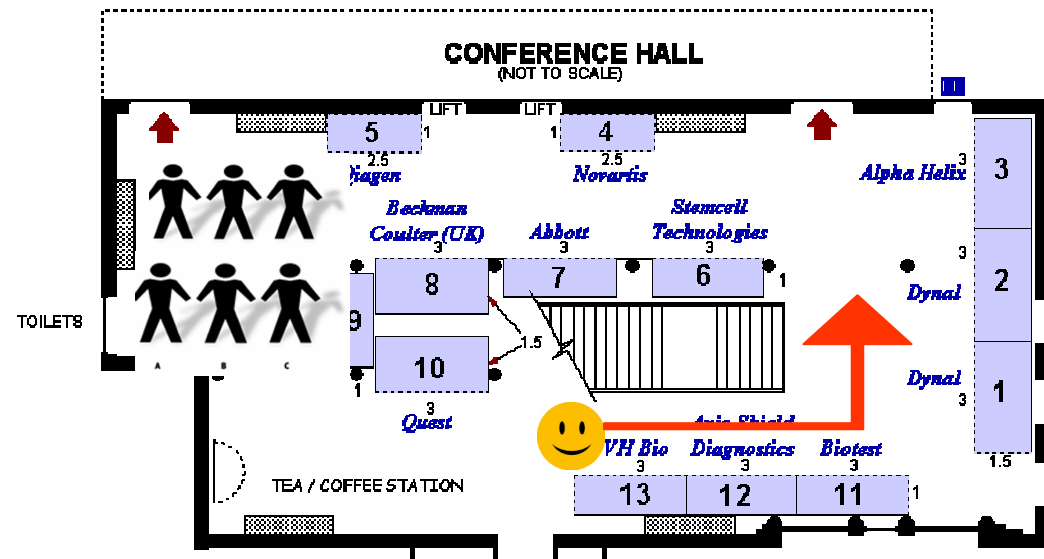


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Sample Application

- Evacuation
- Building map
- Location detection
- Avoid congested regions



Example (Middleware)



Example (Routing)



Other Applications

- Restaurant recommendation (implemented)
- Traffic routing
- Disaster recovery
- ...

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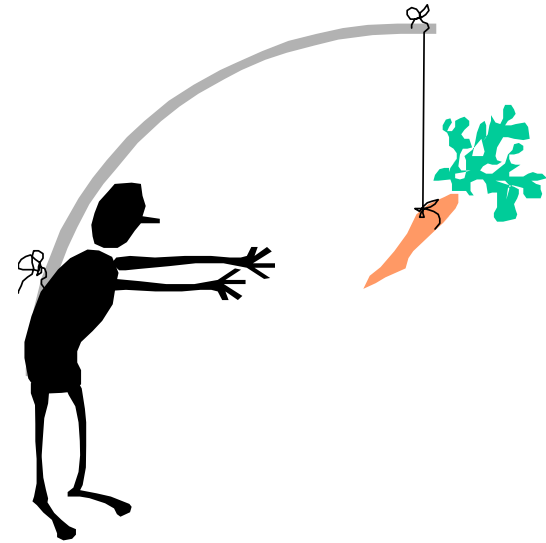
Conclusion

- Ad-hoc mobile data sharing has many applications
- INFINITY is a middleware proposal to address:
 - Device-independent
 - Ad-hoc
 - Data and
 - Application sharing in a
 - Privacy-preserving manner
- Prototype implemented, demo available



Future Work

- Metrics for communication channel selection
- Metrics for query routing
- User identification and authentication
- Caching of query results





Acknowledgements

Rakesh Agrawal
Karin Murthy
Jerry Kiernan



Eva Shon
Yong Yao
Ian Yap
Leonard Lee

