A Property Matcher for Enhanced Privacy in LBS

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PRIME

Roadmap

- Overview & Motivation
- Description of our protocol
- Conclusion & further work

Location Based Services

- Context enabled e-commerce application
- Different architecture setups
  - Application provider
  - Property matcher (PM)
- Identity manager performs:
  - Parts of authorization
  - Payment
- Privacy problem
  - LBS receives personal information
  - E.g. mobile dating

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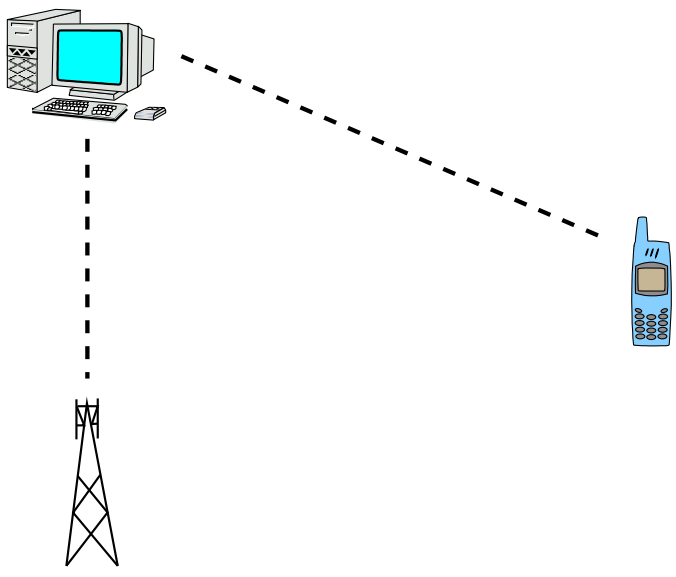

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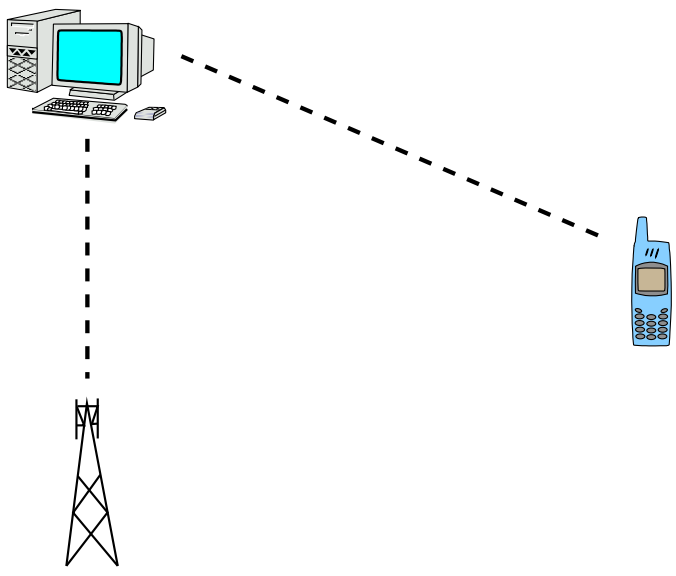

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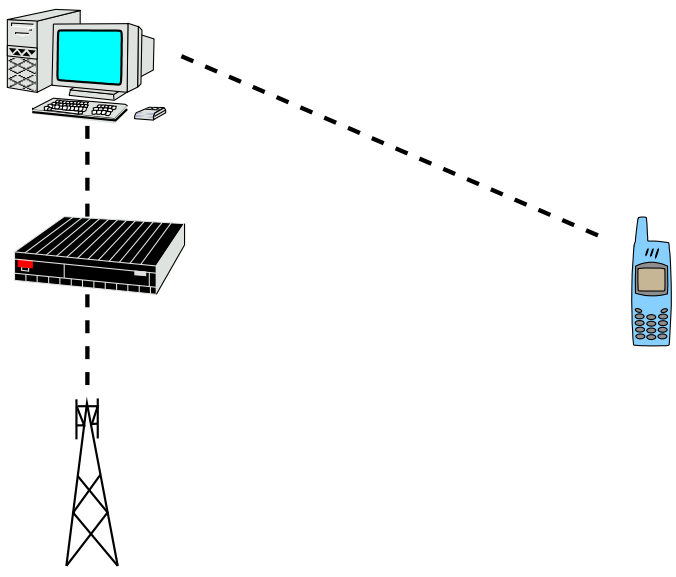

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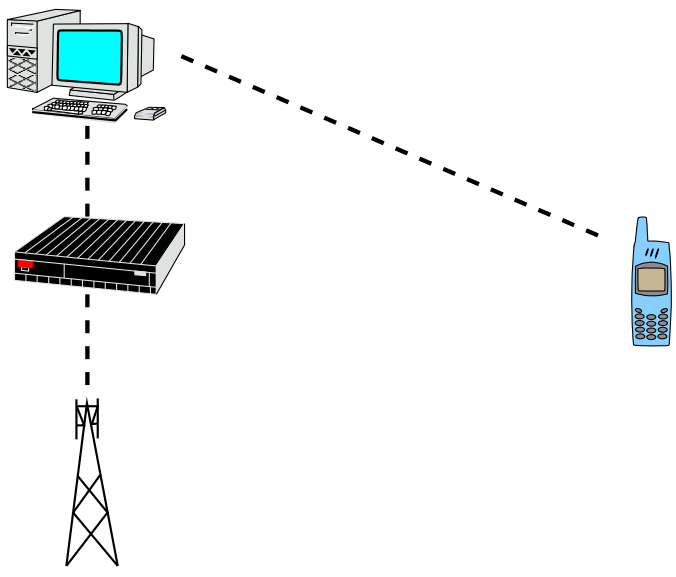


Motivation for Property Matcher

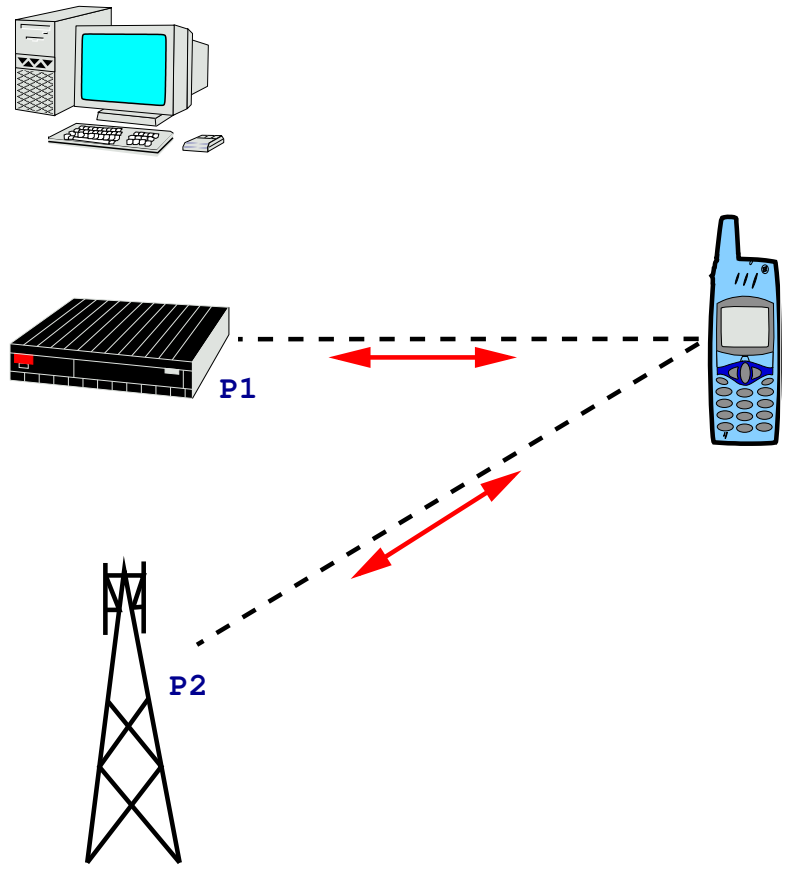
- Interoperability
- Simplicity
- Price reason
- Flexibility
- Accuracy
- Privacy enhancement

Scenarios

Scenario	Service Type	Personal information disclosure
Point of Interest	Pull	Position, request
Guidance	Push	Position, objective
Emergency	Push	Positions
Fleet control	Pull	Various Positions
Friend finder	Pull/Push	Various positions, relationsship
M-Commercials	Push	Position, profile
Allergy warning	Push	Position, profile
Dating	Pull/Push	Position, detailed profile

Overview over protocol

- User sets up infrastructure
- User initiates service and negotiates conditions
- User codes & encrypts data & transmits it
- LBS specifies operation and transmits data
- PM performs operations
- PM provides result
- LBS interprets result & takes action



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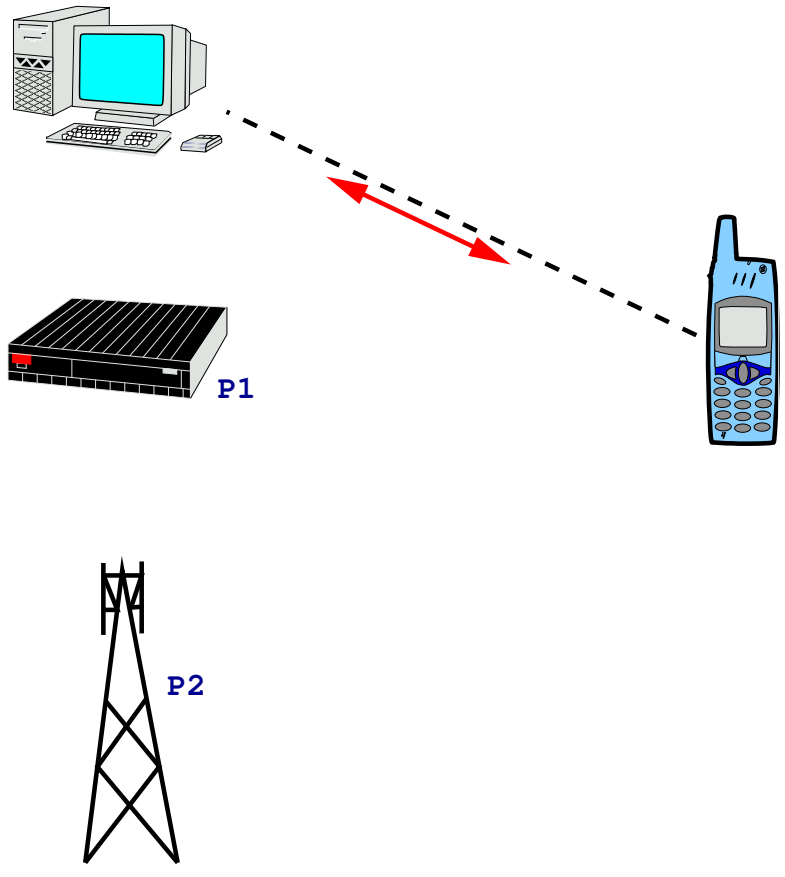

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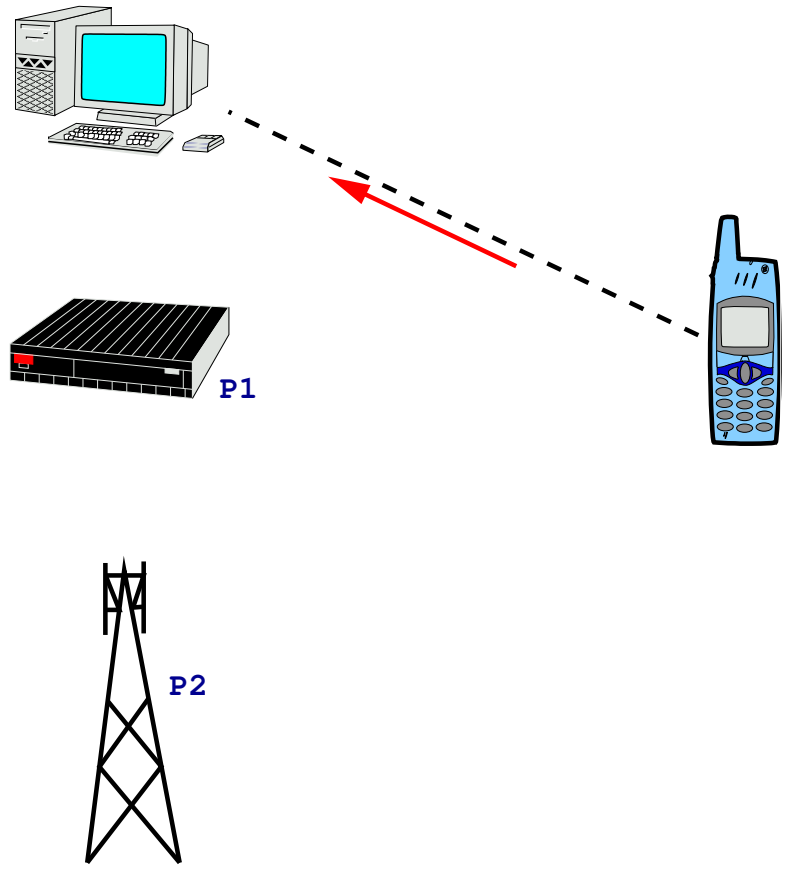

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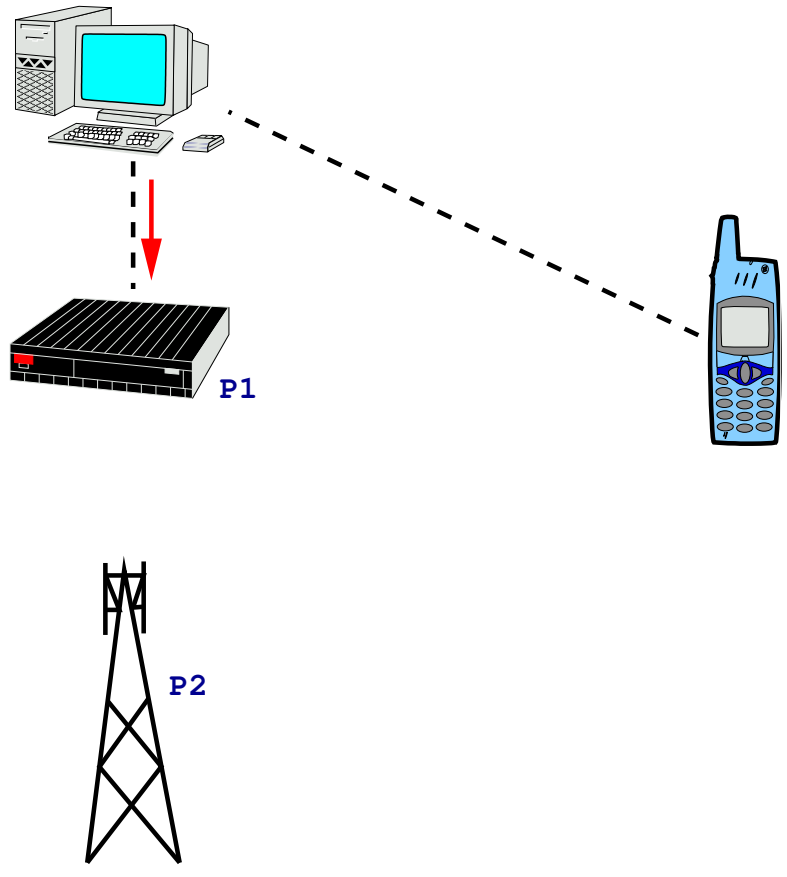

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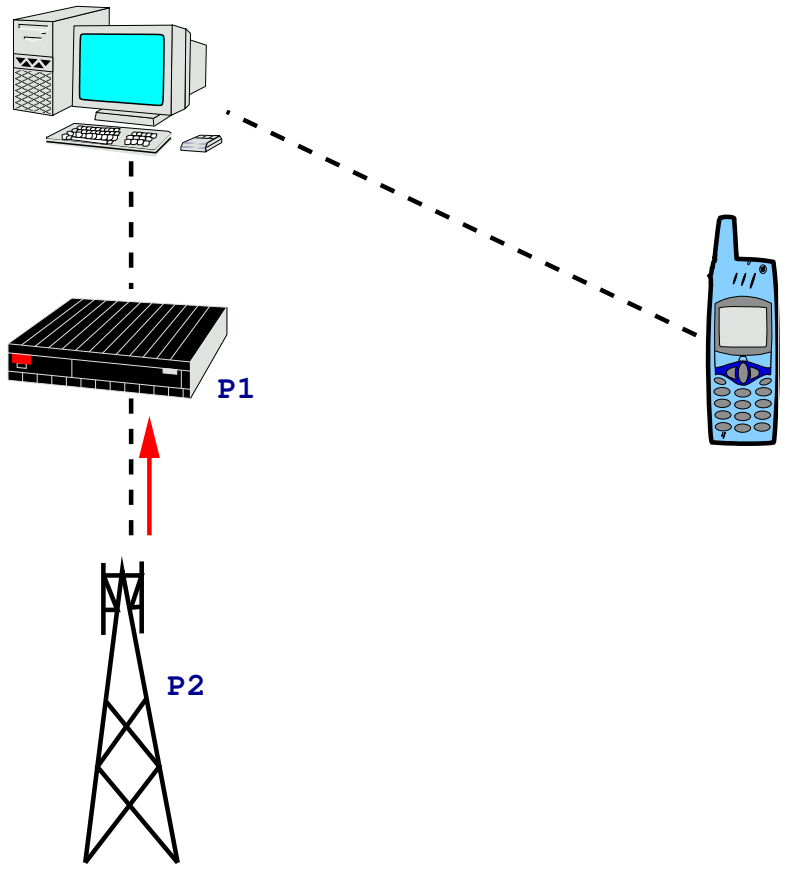

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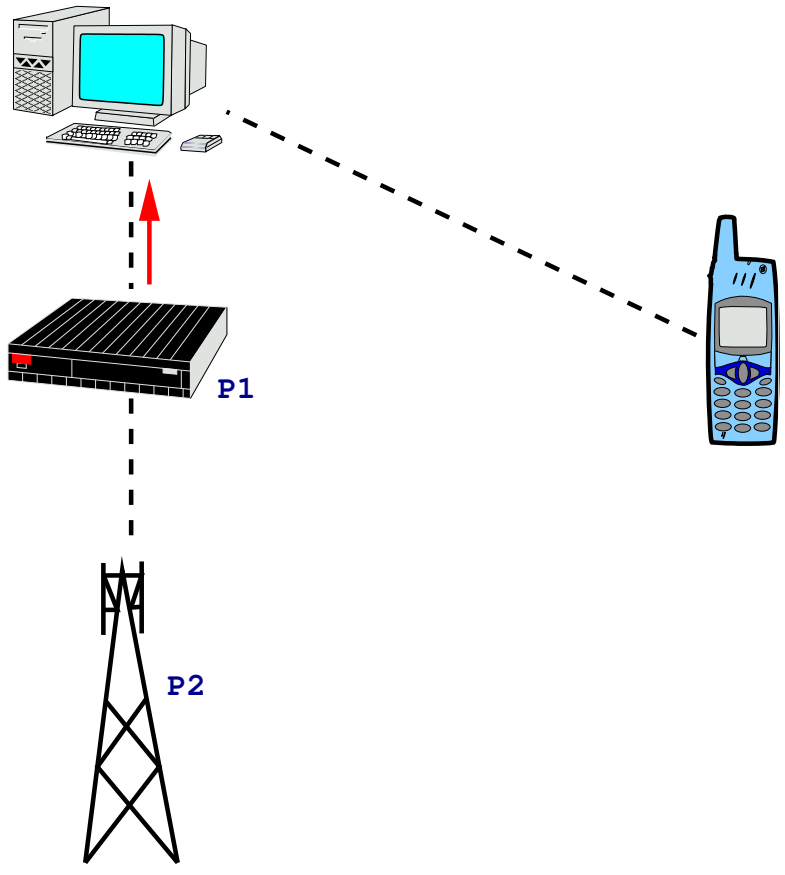

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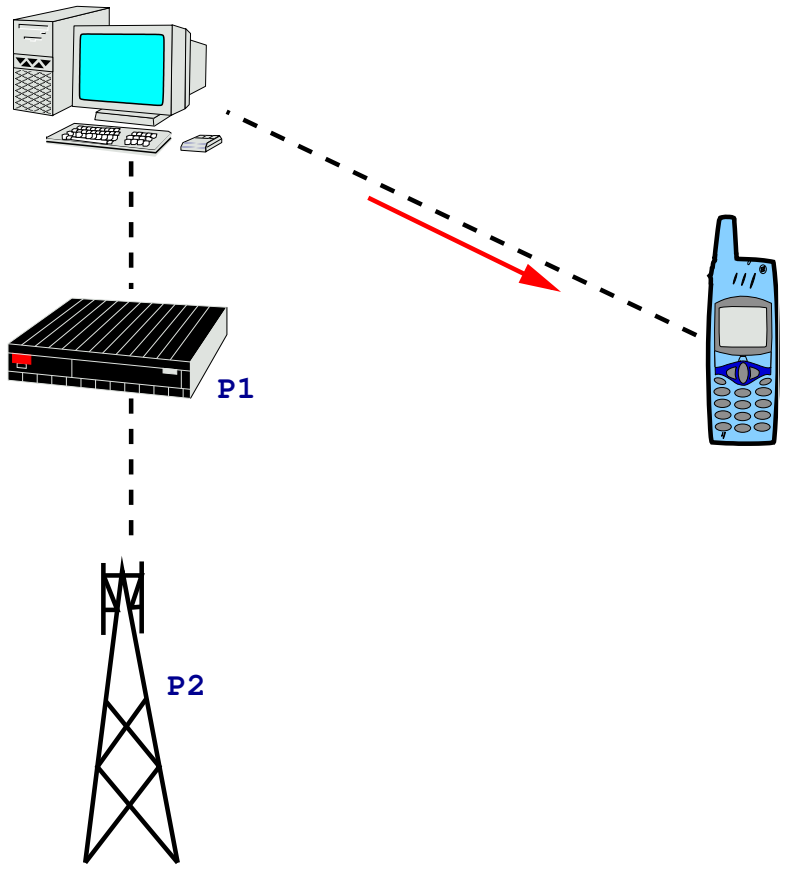
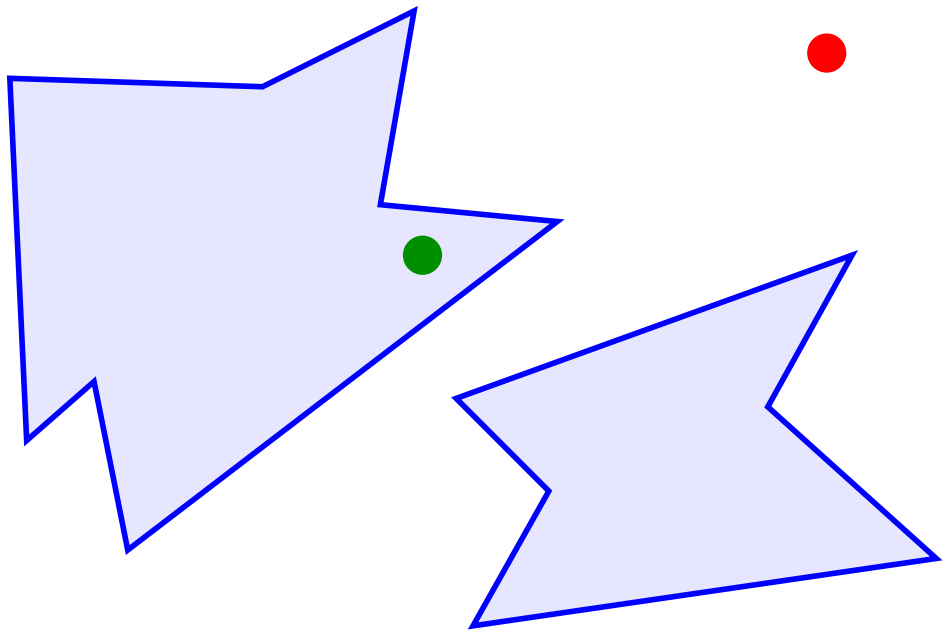


Property Matcher Operation Primitives

- **ConditionMatch:** regions, transformed data
- **SortByDist:** weighting matrix, specification of data
- **CloseBy:** weighting matrix, specification of data, threshold value
- **GetPosition**



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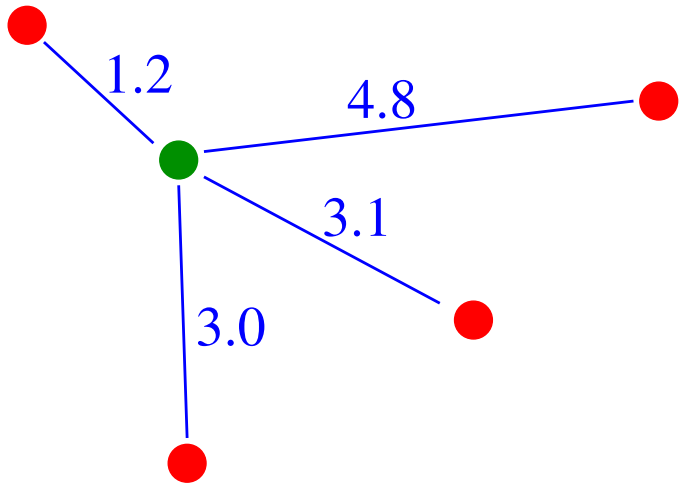

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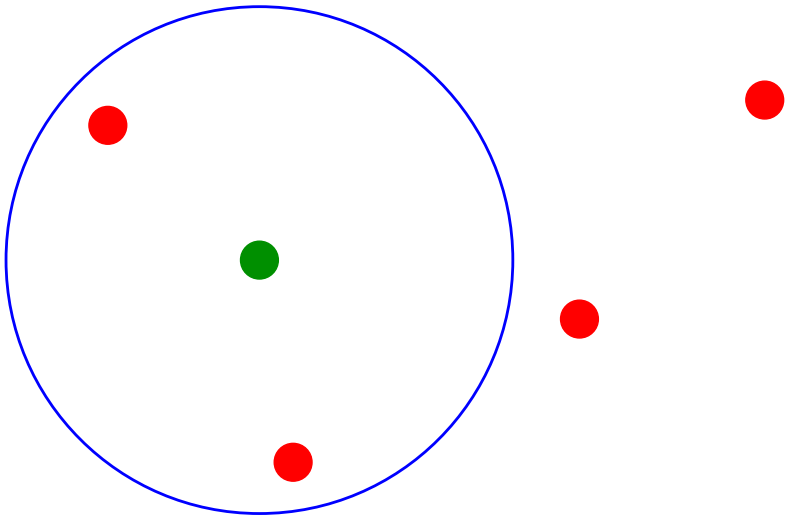

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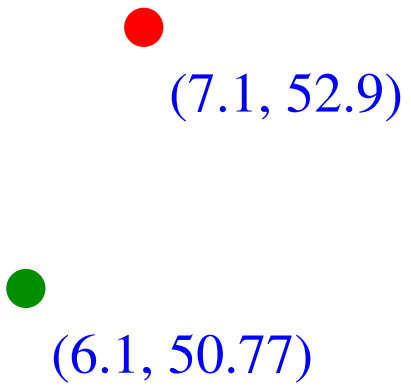

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- Code problem as geometric problem
  - Conditions coded as volumes
  - Attributes coded as points in high dimensional space
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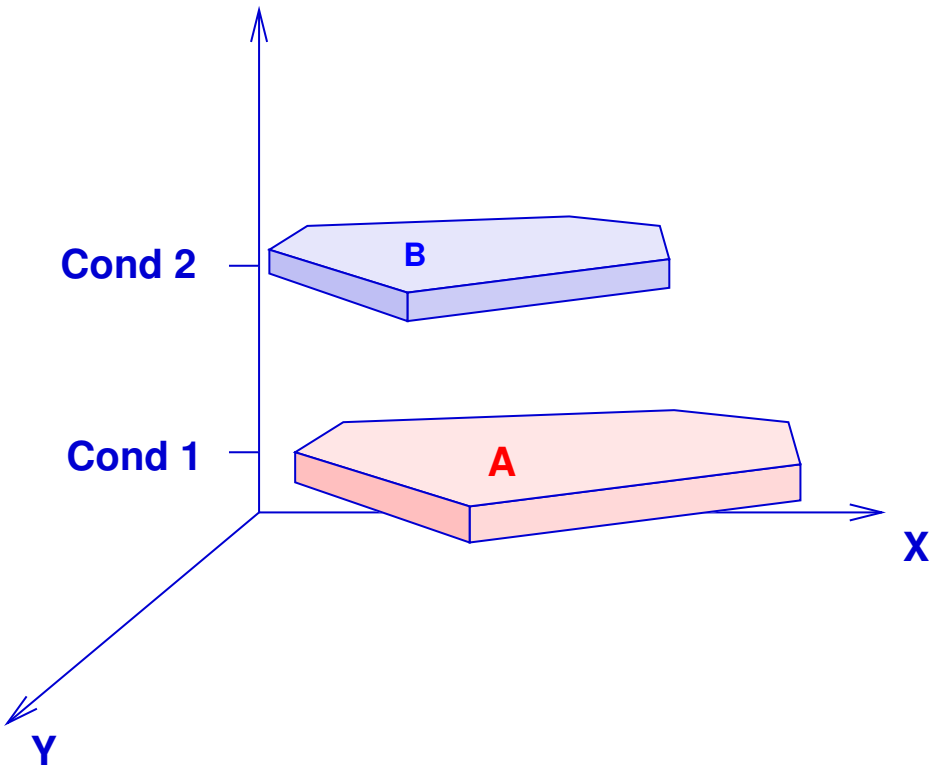

Operations: SortByDist & CloseBy

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$$\begin{pmatrix} 7.3 \\ 53.3 \\ 3 \\ 0 \end{pmatrix} = \begin{pmatrix} \mathit{longitude} \\ \mathit{latitude} \\ 3 * (\mathit{cond}2 = \texttt{true}) \\ 34 * (\mathit{cond}1 \neq \texttt{true}) \end{pmatrix}$$

Implementing the Scenarios

Scenario	**Operation**
Point of Interest	SortByDist
Guidance	GetPosition $\vee$ ConditionMatch
Emergency	SortByDist $\vee$ CloseBy
Fleet control	GetPosition
Friend finder	GetPosition $\vee$ CloseBy
M-Commercials	ConditionMatch
Allergy warning	ConditionMatch
Dating	ConditionMatch $\vee$ CloseBy

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