Game Engineering

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Science (Theory):
Understanding Natural or Social Processes

Engineering:
Using Theory to design practical devices

Game Theory:
Understanding Strategic Interaction

Game Engineering:
Using Game Theory to design practical interactive systems
Game Engineering in one word: Incentives
Valentin de BOULOGNE,
dit LE VALENTIN
Coulommiers (Seine-et-Marne), 1591 -
Rome, 1632

Le Jugement de Salomon. Vers 1625

Devant reconnaître la mère d’un enfant que deux femmes se disputaient, le roi Salomon ordonna de le couper en deux et d’en donner la moitié à chacune. Salomon vit ainsi en celle qui y renonça la vraie mère.

Collection de Louis XIV (acquis des héritiers du cardinal Mazarin en 1661)

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Other Examples of Game Engineering

- Final offer arbitration
- Auctions
  - Strategy
  - Design
- Matching
- Traffic
  - Strategy
  - Design
- Elections
- Asset Division
Traffic - Design
Traffic - Design
Matching

20 men
20 women
Each man has a preference order on the women.
Each woman has a preference order on the men.

A matching is an assignment of men to women.
A matching is unstable if there is a couple who are not matched, and prefer each other to their partners.

Otherwise, it is stable.
Matching

**FACT** (Gale & Shapley, 1962)

There is always a stable matching.

(The number 20 is not important; it is true for any number.)

Applications:

Hospital Interns, Kidney Donations, High Schools
Matching: Two sexes needed

Adam → Bryce → Charles → Donald

Bryce → Charles → Adam → Adam

Charles → Adam → Bryce → Bryce

Donald → Donald → Donald → Charles

Adam → Charles ← Bryce

Donald
Cake Cutting (Asset Division -- Steven Brams)

(1) One child: S/he gets it all.

(2) Two Children:
One cuts, the other chooses

(3) Three Children (Ann, Bob, Cal):
i. Ann cuts a piece of the cake.
ii. Bob can leave it, or make it smaller.
iii. Cal can leave the remaining piece, or make it smaller.

Whoever cuts the cake last, gets the remaining piece.
The rest is divided between the other two children as in (2).
Asset Division
Asset Division
Cake Cutting (Asset Division)

(n) n children:

The children take turns. The first cuts a piece of the cake. The second can leave it, or make it smaller. Each successive child can leave the remaining piece, or make it smaller.

Whoever cuts the cake last, gets the remaining piece. The rest is divided between the remaining children as in (n-1).
Thank You!