

*Xpress case study:
Margaret Oil*



June 2018

Margaret Oil - basic (1)

- Margaret Oil **produces** three products: **gasoline**, **jet fuel**, and **heating oil**.
- The average octane levels must be:

	Gasoline	Jet fuel	Heating oil
Minimum octane	8.5	7	4.5

- To produce these products, Margaret **purchases crude oil** at a price of **11 per barrel**.
- Each day, **at most 15000 barrels can be purchased**.

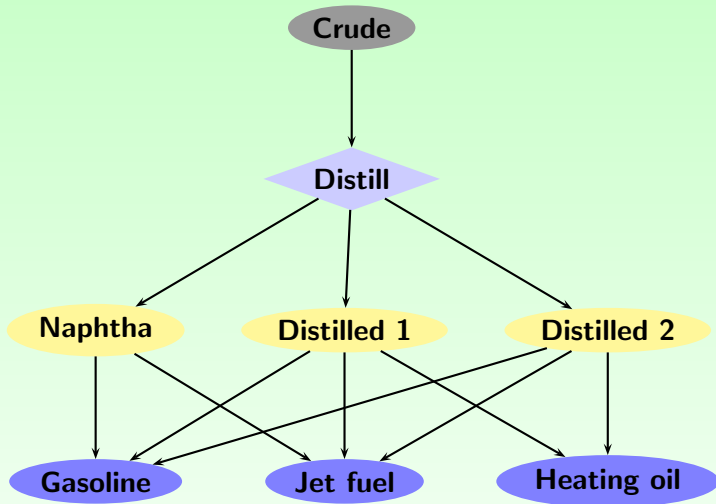
Margaret Oil - basic (2)

- Before crude can be used to produce products for sale, it must be distilled.
- It **costs 0.10 to distill a barrel of oil.**
- The result of the distillation is:

	Distilled 1	Distilled 2	Naphtha
Distill (barrels)	0.25	0.25	0.5

- **Distilled naphtha can be used only to produce gasoline or jet fuel.**
- **Distilled oil can be used to produce all three products.**

Margaret Oil - basic (3)



Margaret Oil - basic (4)

- The octane level of each type of oil is as follows:

	Distilled 1	Distilled 2	Naphtha
Octane	9	4	8

- All gasoline produced can be sold at:

	Gasoline	Jet fuel	Heating oil
Price ()	18	16	14

- Marketing considerations dictate that **at least 3000 barrels of each product must be produced daily.**
- How can Margaret Oils maximize its daily profit?**

Margaret Oil - full (1)

- Margaret Oil **produces** three products: **gasoline, jet fuel,** and **heating oil.**
- The **average octane levels** must be at least:

Final products	Gasoline	Jet Fuel	Heating Oil
Minimum octane	8.5	7	4.5

- Margaret **can purchase two types of crude oil:**
 - **Crude 1** (at **12 per barrel**), and
 - **Crude 2** (at **10 per barrel**).
- Each day **can purchase at most 10000 barrels of each type.**

Margaret Oil - full (2)

- Before crude can be used, it must be distilled.
- Each day, **at most 15000 barrels of oil can be distilled.**
- It **costs 0.10 to distill a barrel** of oil.
- The yield of the distillation is:

Distillation	Distilled 1	Distilled 2	Naphtha
Crude 1	0.3	0.1	0.6
Crude 2	0.2	0.4	0.4

- Distilled **Naphtha can be used only to produce Gasoline or Jet fuel.**
- **Distilled oil can be used to produce Heating Oil or it can be sent through the catalytic cracker (at a cost of 0.15 per barrel).**

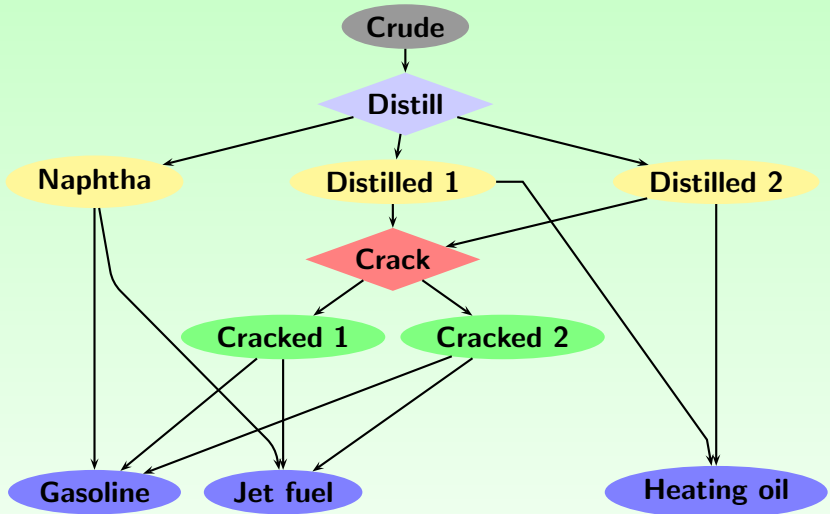
Margaret Oil - full (3)

- **At most 5000 barrels** of distilled oil **can be sent through the cracker.**
- The yield of the cracking process is:

Cracking	Distilled 1	Distilled 2
Cracked 1	0.8	0.7
Cracked 2	0.2	0.3

- **Cracked Oil can be used to produce Gasoline and Jet Fuel but not to produce Heating Oil.**

Margaret Oil - full (4)



Margaret Oil - full (5)

- The octane level of each type of oil is:

	Dist 1	Dist 2	Naphtha	Cracked 1	Cracked 2
Octane	4	5	8	9	6

- Selling prices and minimum productions are:

Final products	Gasoline	Jet fuel	Heating oil
Price ()	18	16	14
Minimum production	2500	3000	3500

- How can Margaret Oils maximize its daily profit?**