AUDUSD=0.8371
CADUSD=0.8711
USDCNY=6.1715
EURUSD=1.2315
GBPUSD=1.5683
NZDUSD=0.7750
USDJPY=119.95
EURCZK=27.6028
EURDKK=7.4405
EURNOK=8.6651

For example "AUDUSD=0.8371" means that 1 Australian Dollar is equivalent to 0.8371 United States Dollars.
The rates specified above are directly quoted, but they can also be used to create non quoted rates.
For example, in the simplest case, the AUDUSD rate can be used to derive USDAUD by simply inverting the rate.
"AUDUSD=0.8371" (1 AUD = 0.8371 USD) is the same as saying "USDAUD=1.1946" (1 USD = 1.1946 AUD).

Inversion is done by 1/0.8371 which is 1.1946

Storage strategy

Currency Index Map	Rates	Direct feed Map storage key/value	Inverted Map storage key/value
1. AUD	AUDUSD=0.8371	111=0.8371	111=1.1946(1/0.8371)
2. CAD	CADUSD=0.8711	211=0.8711	112=1.1479(1/0.8711)
3. CNY	USDCNY=6.1715	113=6.1715	311=0.1620(1/6.1715)
4. CZK	EURUSD=1.2315	611=1.2315	-do-
5. DKK	GBPUSD=1.5683	711=1.5683	-do-
6. EUR	NZDUSD=0.7750	1011=0.7750	-do-
7. GBP	USDJPY=119.95	118=119.95	-do-
8. JPY	EURCZK=27.6028	64=27.6028	-do-
9. NOK	EURDKK=7.4405	65=7.4405	-do-
10. NZD	EURNOK=8.6651	69=8.6651	-do-
11. USD			

Cross Rate Example:

Similarly, to calculate NOK/USD
- look up NOK/USD in the table
- the resulting entry says to cross via EUR
- look up EUR/USD and EUR/NOK, and cross the two to find the NOK/USD rate.

From example derive algorithm for cross currency via another currency by using "cross-via" matrix:

1. Get the **original currency pair NOK/USD**
2. Get the **index** for base currency NOK
3. Get the **index** for terms currency USD
4. Now look in the matrix array[NOK][USD] get the cross-via currency which is **EUR**
5. Build the currency pair - 1 by replacing Original Pair's base currency with the currency identified in step 3. The original **base/terms is NOK/USD** which is changed to **EUR/USD.**
6. Now look in the matrix array[EUR][USD] get the cross-via currency which is **DDD**. This implies the **currency pair as EUR/USD**
7. Store **DDD** as operation and **currency pair - 2** as **EUR/USD**.
8. Build the currency pair - 2 by replacing Original Pair's terms currency with the currency identified in step 3. The original **base/terms is NOK/USD** which is changed to **NOK/EUR.**
9. Now look in the matrix array[NOK][EUR] get the cross-via currency which is **INV**. This implies the **currency pair as NOK/EUR**
10. Store **INV** as operation and **currency pair - 1 as NOK/EUR.**

Learning about cross currency:

https://youtu.be/Gl5i-0GTK40

https://www.youtube.com/watch?v=PeP3C_KN_v8

Validate the algorithm:

1. AUD/JPY 2. Index - 1 3. Index - 8 4. [1][8] = USD 5. USD/JPY 6. [11][8] = D 7. CP-2 -> USD/JPY 8. AUD/USD 9. [1]/[11] = D 10 CP-1 -> AUD/USD AUD/USD - D USD/JPY - D	1. AUD/DKK 2. 3. 4 USD 5USD/DKK	1. NOK/USD 2. Index - 9 3. Index - 11 4. [9][11] = EUR 5. EUR/USD 6. [6]/[11] = D 7. CP-2 -> EUR/USD 8. NOK/EUR 9. [9]/[6] = INV 10 CP-1 -> NOK/EUR NOK/EUR - INV EUR/USD - D

Evaluate Cross Currency for NOK/USD:

For example
1 AUD = 0.8371 USD
0.8371 USD = 100.41 JPY
---
1 AUD = 100.41 JPY

"AUDUSD=0.8371" (1 AUD = 0.8371 USD) is the same as saying "USDAUD=1.1946" (1 USD = 1.1946 AUD).

Cross currency NOK/USD

Inversion operation on NOK/EUR(cp-1):	**Direct Operation on EUR/USD(cp-2):**
EURNOK=8.6651 1EUR=8.6651 NOK NOKEUR=0.1154(1/8.6651) 1NOK = 0.1154 EUR	EURUSD=1.2315 1EUR=1.2315 USD

CP-1 ===> 1NOK = ~~0.1154 EUR~~
CP-2 ===> ~~0.11541EUR~~=1.2315 USD

1 NOK = 1.2315USD

NOK 1 in USD
AUD 1 in JPY

AUD 100.00 in DKK

Decimal Places:

AUD=2 decimal places	AUD=2
CAD=2 decimal places	CAD=2
CNY=2 decimal places	CNY=2
CZK=2 decimal places	CZK=2
DKK=2 decimal places	DKK=2
EUR=2 decimal places	EUR=2
GBP=2 decimal places	GBP=2
JPY=0 decimal places	JPY=0
NOK=2 decimal places	NOK=2
NZD=2 decimal places	NZD=2
USD=2 decimal places	USD=2

Recursive Cross Currency worksheet:

GCR(AUD,DKK):
- BC=AUD
- TC=DKK
- IC = USD
- CR1:GCR(AUD,USD):
  - BC=AUD
  - TC=USD
  - IC=DDD
  - CR=AUDUSD=**0.8371**
- CR2:GCR(USD,DKK)
  - BC=USD
  - TC=DKK
  - IC=EUR
    - CR1:GCR(USD,EUR):
      - BC=USD
      - TC=EUR
      - IC=INV
      - CR=USDEUR=**0.8120**
    - CR2:GCR(EUR,DKK):
      - BC=EUR
      - TC=DKK
      - IC=DDD
      - CR=EURDKK=**7.4405**
  - CR=USDDKK=**6.0416**
- **FINAL=CR1*CR2=5.0574**