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IFIK-40-01

Analisis Masalah

Diberikan masalah sebagai berikut :

Suatu perusahaan Jasa Transportasi Barang beroperasi untuk mengantarkan muatan besar antar empat kota K1, K2, K3, dan K4. Karena besarnya muatan yang ditransportasikan, setiap kendaraan hanya bisa mengangkut satu barang dalam sekali pengantaran. Perusahaan tersebut kemudian ingin membangun system perencanaan jalur untuk mengoptimasi pengantaran setiap kendaraan.

Lalu kita diminta untuk melakukan penelusuran dengan menggunakan Goal Stack Planning untuk menghasilkan kondisi akhir sebagai berikut :

Barang	Saat ini Berada di	Tujuan Kota
B1	K1	K2
B2	K2	K3
B3	K3	K1
B4	K2	K4

Dimana posisi awal kendaraan adalah :

Kendaraan	Saat ini Berada di
M1	K2
M2	K1

Strategi Penyelesaian Masalah

Tahapan dalam menyelesaikan masalah dengan Goal Stack Planning adalah :

1. Menentukan state yang dibutuhkan.
2. Menentukan operasi dan PAD -nya.
3. Menentukan initial state dan goal state.
4. Melakukan penelusuran untuk mendapatkan goal state menggunakan Goal Stack Planning.
5. Menuliskan hasil akhir dari state yang diperoleh dan kesimpulan solusi yang diperoleh untuk mendapatkan goal state.

Daftar state yang dibutuhkan :

States	**Deskripsi**
City(X)	Menjelaskan jika sedang berada di kota X
Transport(X)	Menjelaskan tentang kendaraan X yang dipakai
EMPTYTRANSPORT	Kendaraan tidak sedang mengangkut barang/muatan kosong
Item(X)	Menjelaskan barang X sedang diangkut
InCity(X,Y)	X berada di kota Y
InTransport(X,Y)	X berada di kendaraan Y
TransportOn(X,Y)	Kendaraan X sedang berada di Y

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Operasi dan detail precondition, add, dan delete yang dibutuhkan :

Operators					
PickUp(X,Y,Z)		**PutDown(X,Y,Z)**		**MoveTo(X,Y,Z)**	
P	Item(X) Transport(Y) City(Z) InCity(X,Z) TransportOn(Y,Z) EMPTYTRANSPORT	**P**	Item(X) Transport(Y) City(Z) InTransport(X,Y) TransportOn(Y,Z)	**P**	Transport(X) City(Y) City(Z) TransportOn(X,Y)
A	InTransport(X,Y)	**A**	InCity(X,Z) EMPTYTRANSPORT	**A**	TransportOn(X,Z)
D	InCity(X,Z) EMPTYTRANSPORT	**D**	InTransport(X,Y)	**D**	TransportOn(X,Y)

Berikut ini adalah state awal dan hasil akhir yang diinginkan :

Initial State
Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K1) InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) TransportOn(M2,K1) EMPTYTRANSPORT

Goal State
InCity(B1,K2) InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)

Melakukan penelusuran untuk mendapatkan goal state dari pengantaran barang.

No	Stack	Current State
1		Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K1) InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) TransportOn(M2,K1) EMPTYTRANSPORT
	InCity(B1,K2) InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Solution Queue
	bottom	

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No	Stack	Current State
2	~~Item(B1)~~ ~~Transport(M2)~~ ~~City(K1)~~ ~~InCity(B1,K1)~~ ~~TransportOn(M2,K1)~~ ~~EMPTYTRANSPORT~~ **PickUp(B1,M2,K1) → masuk ke solution queue** ~~Item(B1)~~ ~~Transport(M2)~~ ~~City(K2)~~ InTransport(B1,M2) TransportOn(M2,K2) **PutDown(B1,M2,K2)** InCity(B1,K2) InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K1) InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) TransportOn(M2,K1) EMPTYTRANSPORT Solution Queue
	bottom	

No	Stack	Current State
3	~~Transport(M2)~~ ~~City(K1)~~ ~~City(K2)~~ ~~TransportOn(M2,K1)~~ **MoveTo(M2,K1,K2) → masuk ke solution queue** ~~InTransport(B1,M2)~~ TransportOn(M2,K2) **PutDown(B1,M2,K2)** InCity(B1,K2) InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) ~~InCity(B1,K1)~~ → DELETE InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) TransportOn(M2,K1) ~~EMPTYTRANSPORT~~ → DELETE InTransport(B1,M2) → ADD Solution Queue **PickUp(B1,M2,K1)**
	bottom	

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No	Stack	Current State
4	~~TransportOn(M2,K2)~~ **PutDown(B1,M2,K2) → masuk ke solution queue** InCity(B1,K2) InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) ~~TransportOn(M2,K1)~~ → DELETE InTransport(B1,M2) TransportOn(M2,K2) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)**
	bottom	

No	Stack	Current State
5	~~Item(B2)~~ ~~Transport(M1)~~ ~~City(K2)~~ ~~InCity(B2,K2)~~ ~~TransportOn(M1,K2)~~ ~~EMPTYTRANSPORT~~ **PickUp(B2,M1,K2) → masuk ke solution queue** ~~Item(B2)~~ ~~Transport(M1)~~ ~~City(K3)~~ InTransport(B2,M1) TransportOn(M1,K3) **PutDown(B2,M1,K3)** ~~InCity(B1,K2)~~ InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B2,K2) InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) ~~InTransport(B1,M2)~~ → DELETE TransportOn(M2,K2) InCity(B1,K2) → ADD EMPTYTRANSPORT → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)**
	bottom	

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No	Stack	Current State
6	~~Transport(M1)~~ ~~City(K2)~~ ~~City(K3)~~ ~~TransportOn(M1,K2)~~ **MoveTo(M1,K2,K3) → masuk ke solution queue** ~~InTransport(B2,M1)~~ TransportOn(M1,K3) **PutDown(B2,M1,K3)** InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) ~~InCity(B2,K2)~~ → DELETE InCity(B3,K3) InCity(B4,K2) TransportOn(M1,K2) TransportOn(M2,K2) InCity(B1,K2) ~~EMPTYTRANSPORT~~ → DELETE InTransport(B2,M1) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)**
	bottom	

No	Stack	Current State
7	~~TransportOn(M1,K3)~~ **PutDown(B2,M1,K3) → masuk ke solution queue** InCity(B2,K3) InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B3,K3) InCity(B4,K2) ~~TransportOn(M1,K2)~~ → DELETE TransportOn(M2,K2) InCity(B1,K2) InTransport(B2,M1) TransportOn(M1,K3) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)**
	bottom	

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No	Stack	Current State
8	~~Item(B3)~~ ~~Transport(M1)~~ ~~City(K3)~~ ~~InCity(B3,K3)~~ ~~TransportOn(M1,K3)~~ ~~EMPTYTRANSPORT~~ **PickUp(B3,M1,K3) → masuk ke solution queue** ~~Item(B3)~~ ~~Transport(M1)~~ ~~City(K1)~~ InTransport(B3,M1) TransportOn(M1,K1) **PutDown(B3,M1,K1)** ~~InCity(B2,K3)~~ InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B3,K3) InCity(B4,K2) TransportOn(M2,K2) InCity(B1,K2) ~~InTransport(B2,M1)~~ → DELETE TransportOn(M1,K3) InCity(B2,K3) → ADD EMPTYTRANSPORT → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)**
	bottom	

No	Stack	Current State
9	~~Transport(M1)~~ ~~City(K3)~~ ~~City(K1)~~ ~~TransportOn(M1,K3)~~ **MoveTo(M1,K3,K1) → masuk ke solution queue** ~~InTransport(B3,M1)~~ TransportOn(M1,K1) **PutDown(B3,M1,K1)** InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) ~~InCity(B3,K3)~~ → DELETE InCity(B4,K2) TransportOn(M2,K2) InCity(B1,K2) TransportOn(M1,K3) InCity(B2,K3) ~~EMPTYTRANSPORT~~ → DELETE InTransport(B3,M1) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)**

		PickUp(B3,M1,K3)
	bottom	

No	Stack	Current State
10	~~TransportOn(M1,K1)~~ **PutDown(B3,M1,K1) → masuk ke solution queue** InCity(B3,K1) InCity(B4,K4)	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B4,K2) TransportOn(M2,K2) InCity(B1,K2) ~~TransportOn(M1,K3)~~ → DELETE InCity(B2,K3) InTransport(B3,M1) TransportOn(M1,K1) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)**
	bottom	

No	Stack	Current State
11	~~Item(B4)~~ ~~Transport(M2)~~ ~~City(K2)~~ ~~InCity(B4,K2)~~ ~~TransportOn(M2,K2)~~ ~~EMPTYTRANSPORT~~ **PickUp(B4,M2,K2) → masuk ke solution queue** ~~Item(B4)~~ ~~Transport(M2)~~	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B4,K2) TransportOn(M2,K2) InCity(B1,K2) InCity(B2,K3) ~~InTransport(B3,M1)~~ → DELETE TransportOn(M1,K1) InCity(B3,K1) → ADD EMPTYTRANSPORT → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)**

	~~City(K4)~~ InTransport(B4,M2) TransportOn(M2,K4) **PutDown(B4,M2,K4)** ~~InCity(B3,K1)~~ InCity(B4,K4)	**PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)** **PutDown(B3,M1,K1)**
	bottom	

No	Stack	Current State
12		Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) ~~InCity(B4,K2)~~ → DELETE TransportOn(M2,K2) InCity(B1,K2) InCity(B2,K3) TransportOn(M1,K1) InCity(B3,K1) ~~EMPTYTRANSPORT~~ → DELETE InTransport(B4,M2) → ADD
		Solution Queue
	~~Transport(M2)~~ ~~City(K2)~~ ~~City(K4)~~ ~~TransportOn(M2,K2)~~ **MoveTo(M2,K2,K4) → masuk ke solution queue** ~~InTransport(B4,M2)~~ TransportOn(M2,K4) **PutDown(B4,M2,K4)** InCity(B4,K4)	**PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)** **PutDown(B3,M1,K1)** **PickUp(B4,M2,K2)**
	bottom	

No	Stack	Current State
13		Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) ~~TransportOn(M2,K2)~~ → DELETE InCity(B1,K2) InCity(B2,K3)

	~~TransportOn(M2,K4)~~ **PutDown(B4,M2,K4) → masuk ke solution queue** InCity(B4,K4)	TransportOn(M1,K1) InCity(B3,K1) InTransport(B4,M2) TransportOn(M2,K4) → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)** **PutDown(B3,M1,K1)** **PickUp(B4,M2,K2)** **MoveTo(M2,K2,K4)**
	bottom	

No	Stack	Current State
14	~~InCity(B4,K4)~~	Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K2) InCity(B2,K3) TransportOn(M1,K1) InCity(B3,K1) ~~InTransport(B4,M2)~~ → DELETE TransportOn(M2,K4) InCity(B4,K4) → ADD EMPTYTRANSPORT → ADD Solution Queue **PickUp(B1,M2,K1)** **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)** **PutDown(B3,M1,K1)** **PickUp(B4,M2,K2)** **MoveTo(M2,K2,K4)** **PutDown(B4,M2,K4)**

	bottom	

No	Stack	Current State
15		Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K2) InCity(B2,K3) TransportOn(M1,K1) InCity(B3,K1) TransportOn(M2,K4) InCity(B4,K4) EMPTYTRANSPORT
		Solution Queue
		PickUp(B1,M2,K1) **MoveTo(M2,K1,K2)** **PutDown(B1,M2,K2)** **PickUp(B2,M1,K2)** **MoveTo(M1,K2,K3)** **PutDown(B2,M1,K3)** **PickUp(B3,M1,K3)** **MoveTo(M1,K3,K1)** **PutDown(B3,M1,K1)** **PickUp(B4,M2,K2)** **MoveTo(M2,K2,K4)** **PutDown(B4,M2,K4)**
	bottom	

Dari hasil penelusuran yang dilakukan maka didapatkan solusi perpindahan barang sebagai berikut:

Solution
PickUp(B1,M2,K1) MoveTo(M2,K1,K2) PutDown(B1,M2,K2) PickUp(B2,M1,K2) MoveTo(M1,K2,K3) PutDown(B2,M1,K3) PickUp(B3,M1,K3) MoveTo(M1,K3,K1) PutDown(B3,M1,K1) PickUp(B4,M2,K2) MoveTo(M2,K2,K4) PutDown(B4,M2,K4)

Goal State
Transport(M1), Transport(M2) Item(B1), Item(B2), Item(B3), Item(B4) City(K1), City(K2), City(K3), City(K4) InCity(B1,K2) InCity(B2,K3) TransportOn(M1,K1) InCity(B3,K1) TransportOn(M2,K4) InCity(B4,K4) EMPTYTRANSPORT