

## Airline Contract Partner Project

### Business Problem:

Company A needs to identify an airline with which to partner for all of their direct travel (between major locations) needs. Convenience and performance are the primary tools used to classify potential airline associates. Company A has major locations in Washington D.C., Tampa, Jacksonville, and Atlanta.

### Discussion of Findings:

The primary metric of convenience is number of flights (*Appendix total\_flights*) and will help to narrow the pool of possible carriers to the largest providers of service which can then be further evaluated to determine the best choice. This can be seen in the SQL query as the *total\_flights* column showing total flights flown by a carrier in that particular market (from one specific region to another). Using column data with supportive data from Expedia.com regarding stops (see table below for 1-stop data), Delta, Southwest, Jet Blue, American, United and US airways offer the most service connections but with varying amounts of stops. However, Delta and Southwest are the only airlines to provide service from/to every market.

		FLYING FROM							
FLYING TO		DIRECT				1-Stop*			
		Washington D.C.	Tampa	Atlanta	Jacksonville	Washington D.C.	Tampa	Atlanta	Jacksonville
	Washington D.C.	N/A	US Airways	Delta Southwest United	Jet Blue	N/A	Delta American Southwest	American	Delta United American Southwest
	Tampa	US Airways United Jet Blue	N/A	Delta Southwest	x	Delta American Southwest	N/A	Delta American	Delta American United JetBlue Southwest
	Atlanta	Delta Southwest	x	N/A	x	American United JetBlue	American Delta United JetBlue Southwest	N/A	American Delta United JetBlue Southwest
	Jacksonville	Jet Blue	x	Delta Southwest	N/A	Delta American United Southwest	Delta American United JetBlue Southwest	United American JetBlue	N/A

<sup>1</sup> \*information from expedia.com and southwest.com (for southwest airlines)

NOTE: <direct flights only> airlines are listed in order of number of flights (greatest on top) with routes <100 flights ignored for this chart as outliers

An additional convenience metric is flight time. This is denoted in the query by the column head `AirTime` and is the average amount of time a plane spends flying from one location to another. Delta has consistently lower flight time averages when compared to Southwest and almost every other airline for each non-stop market (*Appendix AirTime*) they service. Delta is the clear winner for convenience metrics with a strong showing from Southwest Airlines.

The primary metric of performance is the amount of delays and cancellations for each market. The percent of cancelled flights for each carrier in each market is the `Per_cancelled` column in the SQL query. Again, Delta is the clear winner in each market with percent cancellations less than 1% and lower than their competitors. The average delay by carrier for each market is determined in the SQL query as the `AVG_delay` column. Delta has average delay times half that of Southwest. On performance and convenience metrics for this market (Washington D.C., Tampa, Atlanta, and Jacksonville), Delta is the clear standout.

**Recommendation:**

Delta is the best choice for contract partner because the airline services all needed markets with primarily direct flights supported by single stop flights in the remaining regions. Additionally, Delta flights are shorter in duration, have fewer delays, and are less likely to be cancelled than their competitors.

## CODE APPENDIX

### I. Airport codes for involved cities:

- A. Washington DC:
  - 1. DCA: Ronald Reagan Washington National Airport
  - 2. IAD: Washington Dulles International Airport
  - 3. BWI: Baltimore/Washington International Thurgood Marshall Airport
- B. Tampa:
  - 1. PIE: St. Petersburg/Clearwater International Airport
  - 2. TPA: Tampa International Airport
- C. Jacksonville:
  - 1. JAX: Jacksonville International Airport
- D. Atlanta:
  - 1. ATL: Hartsfield-Jackson Atlanta International Airport

### II. SQL CODE

```

SELECT flights.carrier, carriers.name, flights.origin, flights.dest,
SUM(flights.cancelled)/COUNT(flights.flight)*100 AS Per_cancelled, AVG(flights.dep_delay) AS
AVG_delay, count(flights.flight) AS total_flights, avg(flights.air_time) AS AirTime FROM flights
JOIN carriers ON flights.carrier=carriers.carrier
WHERE origin IN (SELECT faa FROM airports WHERE origin=faa AND name LIKE '%Jacksonville%'
OR name LIKE '%Tampa%' OR name LIKE '%Atlanta%')
AND dest IN (SELECT faa FROM airports WHERE dest=faa AND name LIKE '%Washington%')
GROUP BY carrier
ORDER BY origin, total_flights desc;

```

	carrier	name	origin	dest	Per_cancelled	AVG_delay	total_flights	AirTime
►	DL	Delta Air Lines Inc.	ATL	DCA	0.8483	7.9355	32771	77.2807
	WN	Southwest Airlines Co.	ATL	BWI	1.5217	10.7134	18466	93.1218
	FL	AirTran Airways Corporation	ATL	DCA	1.1058	8.9852	7777	83.8637
	EV	ExpressJet Airlines Inc.	ATL	IAD	3.5833	14.7336	3600	79.3083
	UA	United Air Lines Inc.	ATL	IAD	0.7585	8.6899	3164	107.3382
	YV	Mesa Airlines Inc.	ATL	IAD	3.8560	9.7935	1167	78.9589
	F9	Frontier Airlines Inc.	ATL	IAD	0.5376	18.8011	558	83.0376
	9E	Endeavor Air Inc.	ATL	IAD	5.3191	10.4840	376	72.8298
	OO	SkyWest Airlines Inc.	ATL	IAD	2.5126	5.7186	199	76.2412
	NK	Spirit Air Lines	ATL	BWI	1.0152	14.5279	197	80.7310
	B6	JetBlue Airways	JAX	DCA	0.7383	5.0644	2438	101.4696
	AA	American Airlines Inc.	JAX	DCA	0.6812	3.7084	734	110.3338
	US	US Airways Inc.	TPA	DCA	1.4428	3.2891	3812	108.0005

```

SELECT flights.carrier, carriers.name, flights.origin,
SUM(flights.cancelled)/COUNT(flights.flight)*100 AS Per_cancelled, AVG(flights.dep_delay) AS
AVG_delay, flights.dest, count(flights.flight) AS total_flights, avg(flights.air_time) AS AirTime
FROM flights
JOIN carriers ON flights.carrier=carriers.carrier
WHERE origin IN (SELECT faa FROM airports WHERE origin=faa AND name LIKE '%Washington%'
OR name LIKE '%Tampa%' OR name LIKE '%Atlanta%')
AND dest IN (SELECT faa FROM airports WHERE dest=faa AND name LIKE '%Jacksonville%')
GROUP BY carrier
ORDER BY origin, total_flights desc;

```

	carrier	name	origin	Per_cancelled	AVG_delay	dest	total_flights	AirTime
▶	DL	Delta Air Lines Inc.	ATL	0.4381	7.2217	JAX	12553	42.6532
	WN	Southwest Airlines Co.	ATL	0.8348	14.2192	JAX	5151	81.4459
	FL	AirTran Airways Corporation	ATL	0.7179	8.7665	JAX	2368	42.9683
	EV	ExpressJet Airlines Inc.	ATL	3.1414	14.6901	JAX	955	100.1414
	B6	JetBlue Airways	DCA	0.6596	3.8879	JAX	758	95.6214
	AA	American Airlines Inc.	DCA	0.0000	-6.0000	JAX	2	97.5000
	US	US Airways Inc.	DCA	0.0000	16.0000	JAX	1	96.0000
	YV	Mesa Airlines Inc.	IAD	1.9031	11.2249	JAX	578	88.7803

```

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AVG_delay, count(flights.flight) AS total_flights, avg(flights.air_time) AS AirTime FROM flights
JOIN carriers ON flights.carrier=carriers.carrier
WHERE origin IN (SELECT faa FROM airports WHERE origin=faa AND name LIKE '%Washington%'
OR name LIKE '%Jacksonville%' OR name LIKE '%Atlanta%')
AND dest IN (SELECT faa FROM airports WHERE dest=faa AND name LIKE '%Tampa%')
GROUP BY carrier
ORDER BY origin, total_flights desc;

```

	carrier	name	origin	dest	Per_cancelled	AVG_delay	total_flights	AirTime
▶	DL	Delta Air Lines Inc.	ATL	TPA	0.4367	7.8453	14428	59.7659
	WN	Southwest Airlines Co.	ATL	TPA	1.0621	13.5491	10074	102.2533
	FL	AirTran Airways Corporation	ATL	TPA	0.7252	10.7925	5654	75.2952
	NK	Spirit Air Lines	ATL	TPA	1.6194	30.3279	247	61.3158
	EV	ExpressJet Airlines Inc.	ATL	TPA	0.0000	-1.0000	3	58.6667
	US	US Airways Inc.	DCA	TPA	1.2083	3.1531	3807	117.5540
	B6	JetBlue Airways	DCA	TPA	0.6544	6.0744	1681	117.2261
	AA	American Airlines Inc.	DCA	TPA	0.5442	7.5673	735	116.2626
	UA	United Air Lines Inc.	IAD	TPA	0.6673	12.3181	3147	112.9940
	F9	Frontier Airlines Inc.	IAD	TPA	0.9524	15.5333	105	115.4000

```

SELECT flights.carrier, carriers.name, flights.origin, flights.dest,
SUM(flights.cancelled)/COUNT(flights.flight)*100 AS Per_cancelled, AVG(flights.dep_delay) AS
AVG_delay, count(flights.flight) AS total_flights, avg(flights.air_time) AS AirTime FROM flights
JOIN carriers ON flights.carrier=carriers.carrier
WHERE origin IN (SELECT faa FROM airports WHERE origin=faa AND name LIKE '%Washington%'
OR name LIKE '%Jacksonville%' OR name LIKE '%Tampa%')

```

AND dest IN (SELECT faa FROM airports WHERE dest=faa AND name LIKE '%Atlanta%')  
GROUP BY carrier  
ORDER BY origin, total\_flights desc;

	carrier	name	origin	dest	Per_cancelled	AVG_delay	total_flights	AirTime
▶	DL	Delta Air Lines Inc.	BWI	ATL	0.7314	7.0330	59751	71.2734
	FL	AirTran Airways Corporation	BWI	ATL	1.1840	5.5252	13091	71.8536
	WN	Southwest Airlines Co.	BWI	ATL	1.9445	10.0732	12497	75.8620
	EV	ExpressJet Airlines Inc.	BWI	ATL	3.8177	17.5127	2567	80.1858
	NK	Spirit Air Lines	BWI	ATL	1.3514	24.1419	444	73.9099
	YV	Mesa Airlines Inc.	IAD	ATL	3.9640	8.1820	555	80.4036
	F9	Frontier Airlines Inc.	IAD	ATL	0.2212	18.4823	452	83.2279
	9E	Endeavor Air Inc.	IAD	ATL	6.1170	4.9043	376	78.0106
	OO	SkyWest Airlines Inc.	IAD	ATL	1.1628	8.9535	86	85.7558
	UA	United Air Lines Inc.	IAD	ATL	0.0000	20.2821	39	79.7949