

## How the GBN Team Assignment Algorithm Works:

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GBN member Dagan Heaps has written a computer program that automatically assigns all players for a given tournament to a team. The program employs an algorithm that attempts to create teams of more or less equal competitiveness. It employs "Stated Handicaps" (as reported by the players) and a random number generator to achieve this goal.

The first step in the algorithm is to determine the ideal number of teams and the ideal team size for the number of players registered. Here are the possible combinations:

Players	Team Assignments
1	1 team of 1 player
2	1 team of 2 players
3	1 team of 3 players
4	2 teams of 2 players
5	1 team of 3 players, and 1 team of 2 players
6	2 teams of 3 players
7	1 team of 4 players, and 1 team of 3 players
8	2 teams of 4 players
9	3 teams of 3 players
>9	2+ teams of 4 or 3 players

For the example in this document, we will use the actual player lineup from the tournament conducted on October 9, 2014. The tournament initially featured 29 players. Using the table above, the algorithm determined that the optimal number of teams was 8. It also determined that the optimal team composition would be five teams of 4 players and three teams of 3 players.

Next, the algorithm assigns a random number (ranging from approximately 0.0001 to 0.9999) to each player participating in the tournament. It then sorts all of the players by descending order of Stated Handicap, with ties broken by ascending Random Number, as shown below:

Tournament Date	Player Name	Stated Handicap	Random Number
09-Oct-14	Mark Breeden	25	0.1991559
09-Oct-14	Brian Dugdale	25	0.7921122
09-Oct-14	Steve Blood	25	0.8541406
09-Oct-14	Joe Dutton	25	0.8866451
09-Oct-14	John Smee	22	0.3970352
09-Oct-14	Jenn Mount	22	0.4352894
09-Oct-14	Russ Wallace	22	0.7206323
09-Oct-14	Kathy King	21	0.8688613
09-Oct-14	Eddie Erwin	20	0.3061103
09-Oct-14	Ken Saltink	20	0.5675337
09-Oct-14	Terry Mosley	20	0.7037013
09-Oct-14	Shane Chambers	20	0.9835128
09-Oct-14	Michael McCarty	19	0.2201185
09-Oct-14	Tim Coleman	18	0.3271528
09-Oct-14	Johnny O'Brien	18	0.6008512
09-Oct-14	Greg Strange	17	0.2036584
09-Oct-14	Barry Helms	17	0.4197785
09-Oct-14	Chuck Stickl	17	0.8685069
09-Oct-14	Jim Deatherage	16	0.5428626
09-Oct-14	Jack Parker	15	0.3769753
09-Oct-14	Brett Beaver	14	0.01686233
09-Oct-14	Steve Douglas	14	0.1586858
09-Oct-14	Dagan Heaps	14	0.3021346
09-Oct-14	Carter Cowan	13	0.002958775
09-Oct-14	Joe Rodanski	13	0.6598267
09-Oct-14	Austin Metts	11	0.8645279
09-Oct-14	Joe Francella	11	0.8760227
09-Oct-14	Shawn Slavin	9	0.8407525
09-Oct-14	Levi Molini	0	0.7742563

Next, since we have 8 teams participating, the algorithm assigns a letter grade “D” to the first 8 highest Handicap players. The next 8 highest Handicap players are assigned letter grade “C”, the next 8 get “B” and the remaining players—however many there are, which in our example is 5—get letter grade “A”:

Tournament Date	Player Name	Stated Handicap	Random Number	Letter Grade
09-Oct-14	Mark Breeden	25	0.1991559	D
09-Oct-14	Brian Dugdale	25	0.7921122	D
09-Oct-14	Steve Blood	25	0.8541406	D
09-Oct-14	Joe Dutton	25	0.8866451	D
09-Oct-14	John Smee	22	0.3970352	D
09-Oct-14	Jenn Mount	22	0.4352894	D
09-Oct-14	Russ Wallace	22	0.7206323	D
09-Oct-14	Kathy King	21	0.8688613	D
09-Oct-14	Eddie Erwin	20	0.3061103	C
09-Oct-14	Ken Saltink	20	0.5675337	C
09-Oct-14	Terry Mosley	20	0.7037013	C
09-Oct-14	Shane Chambers	20	0.9835128	C
09-Oct-14	Michael McCarty	19	0.2201185	C
09-Oct-14	Tim Coleman	18	0.3271528	C
09-Oct-14	Johnny O'Brien	18	0.6008512	C
09-Oct-14	Greg Strange	17	0.2036584	C
09-Oct-14	Barry Helms	17	0.4197785	B
09-Oct-14	Chuck Stickl	17	0.8685069	B
09-Oct-14	Jim Deatherage	16	0.5428626	B
09-Oct-14	Jack Parker	15	0.3769753	B
09-Oct-14	Brett Beaver	14	0.01686233	B
09-Oct-14	Steve Douglas	14	0.1586858	B
09-Oct-14	Dagan Heaps	14	0.3021346	B
09-Oct-14	Carter Cowan	13	0.002958775	B
09-Oct-14	Joe Rodanski	13	0.6598267	A
09-Oct-14	Austin Metts	11	0.8645279	A
09-Oct-14	Joe Francella	11	0.8760227	A
09-Oct-14	Shawn Slavin	9	0.8407525	A
09-Oct-14	Levi Molini	0	0.7742563	A

We assign the “D” rated players first to ensure that teams with less than 4 players are not assigned an “A” rated player. This decision was based on observations from several GBN board members who concluded that “short” teams (those with fewer than 4 players) have a bit of an advantage due to the fact that one player will have the opportunity to swing twice in a row on each shot. This often leads to “learning” that benefits the player on his or her second shot. To counter-balance this advantage, we don’t assign an “A” rated player to a “short” team.

Notice that with this approach, two players with the exact same Handicap can receive different letter grades. For example, Greg Strange, Barry Helms, and Chuck Stickl all declared Handicaps of 17. However, Greg received a “C” letter grade, while Barry and Chuck received a “B”. Similarly, Carter Cowan and Joe Rodanski both declared 13 Handicaps, but Carter received a “B” and Joe received an “A”. We see no way to avoid this situation. Consequently, we rely on the Random Number to break the ties, with the expectation that OVER TIME, no systematic advantage will accrue to any player or team.

Finally, please also note that there is no “fixed” Handicap range for Letter Grade assignments. The range is completely dependent upon the number and quality of players registered to compete in any given tournament. So, if only the very best players show up for a given tournament, there will still be “D” rated players for that tournament. On the other hand, if only the very worst players show up, there will still be “A” rated players for that tournament. In addition, while the range of handicaps for each letter grade should ideally be “tight”, there is no way to guarantee this for each and every tournament. Here again, we rely on the Random Number to keep things fair OVER TIME.

The next step is to go through another sorting process that puts all the “D” players into a separate list that is sorted by the Random Number in ascending order. The first “D” player goes to Team 1, the second to Team 2, and so forth until all “D” players are assigned. The process is repeated for the “C” players, then the “B” players, and finally the “A” players:

Tournament Date	Player Name	Stated Handicap	Letter Grade	Random Number	Team Assignment
09-Oct-14	Mark Breeden	25	D	0.1991559	1
09-Oct-14	John Smee	22	D	0.3970352	2
09-Oct-14	Jenn Mount	22	D	0.4352894	3
09-Oct-14	Russ Wallace	22	D	0.7206323	4
09-Oct-14	Brian Dugdale	25	D	0.7921122	5
09-Oct-14	Steve Blood	25	D	0.8541406	6
09-Oct-14	Kathy King	21	D	0.8688613	7
09-Oct-14	Joe Dutton	25	D	0.8866451	8

09-Oct-14	Greg Strange	17	C	0.2036584	1
09-Oct-14	Michael McCarty	19	C	0.2201185	2
09-Oct-14	Eddie Erwin	20	C	0.3061103	3
09-Oct-14	Tim Coleman	18	C	0.3271528	4
09-Oct-14	Ken Saltink	20	C	0.5675337	5
09-Oct-14	Johnny O'Brien	18	C	0.6008512	6
09-Oct-14	Terry Mosley	20	C	0.7037013	7
09-Oct-14	Shane Chambers	20	C	0.9835128	8

09-Oct-14	Carter Cowan	13	B	0.002958775	1
09-Oct-14	Brett Beaver	14	B	0.01686233	2
09-Oct-14	Steve Douglas	14	B	0.1586858	3
09-Oct-14	Dagan Heaps	14	B	0.3021346	4
09-Oct-14	Jack Parker	15	B	0.3769753	5
09-Oct-14	Barry Helms	17	B	0.4197785	6
09-Oct-14	Jim Deatherage	16	B	0.5428626	7
09-Oct-14	Chuck Stickl	17	B	0.8685069	8

09-Oct-14	Joe Rodanski	13	A	0.6598267	1
09-Oct-14	Levi Molini	0	A	0.7742563	2
09-Oct-14	Shawn Slavin	9	A	0.8407525	3
09-Oct-14	Austin Metts	11	A	0.8645279	4
09-Oct-14	Joe Francella	11	A	0.8760227	5

At this point, we have an “unaltered” set of Team Assignments. The program presents the data in a convenient report format, as shown below:

## **GBN Team Assignments**

*for the Tournament scheduled for Thursday, October 9, 2014*

Player Name	Handicap	Rating	Member?	KT?	Payout	CTP Winner?
<b>Team 1</b> 68						
Joe Rodanski	13	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Carter Cowan	13	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Greg Strange	17	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Mark Breeden	25	D	<input type="checkbox"/>			<input type="checkbox"/>
<b>Team 2</b> 55						
Levi Molini	0	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Brett Beaver	14	B	<input type="checkbox"/>			<input type="checkbox"/>
Michael McCarty	19	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
John Smee	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 3</b> 65						
Shawn Slavin	9	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Steve Douglas	14	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Eddie Erwin	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Jenn Mount	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 4</b> 65						
Austin Metts	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Dagan Heaps	14	B	<input checked="" type="checkbox"/>	2KT		<input type="checkbox"/>
Tim Coleman	18	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Russ Wallace	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 5</b> 71						
Joe Francoella	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Jack Parker	15	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Ken Saltink	20	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Brian Dugdale	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 6</b> 60						
Barry Helms	17	B	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Johnny O'Brien	18	C	<input type="checkbox"/>	1KT		<input type="checkbox"/>
Steve Blood	25	D	<input type="checkbox"/>			<input type="checkbox"/>
<b>Team 7</b> 57						
Jim Deatherage	16	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Terry Mosley	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Kathy King	21	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 8</b> 62						
Chuck Stickl	17	B	<input checked="" type="checkbox"/>	1KT		<input type="checkbox"/>
Shane Chambers	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Joe Dutton	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>

Please note that the total “Team Handicap” for the 8 teams in this example is NOT equal for all Teams, even in “unaltered” form. For example, Team 2, with a combined Handicap of 55, would seem to have a substantial advantage over everyone—especially Team 5, with a combined Handicap of 71. Given the random nature of the algorithm, this type of disparity can potentially

creep in from time to time. However, we believe that the algorithm produces highly desirable results OVER TIME (if not on every single individual tournament), with no one player or team consistently receiving an advantage or disadvantage relative to other players or teams.

## Manual Team Alterations:

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The Team Assignments task is further complicated by the fact that we try to accommodate special requests wherever possible. The net effect of accommodating such requests will almost always be to *decrease* the “fairness” of the algorithm. But we nevertheless allow several special requests, such as:

- 1) **Keep Togethers:** This is where two or more players request to play on the same team. In our example, Chuck Stikl requested to play with first-time guest Johnny O’Brien, as noted by the “1KT” on the above report. Also, Dagan Heaps had three first-time guests attending this tournament, and they all wanted to play together (2KT). Our current policy is ONE “Keep Together” per player “pairing” per year, but with an eye towards flexibility and a willingness to deal with abuse if it arises.
- 2) **Go Earlies:** This is where a player requests to play with one of the first few teams to tee off, typically so he or she can have enough time to finish the tournament before having to leave for another commitment elsewhere. In our example, Chuck Stikl (and hence Johnny O’Brien) requested to go off first. Michael McCarty, Tim Coleman, and Mark Breeden all requested to go off early. We try to accommodate all such requests by placing the player on one of the first few teams going out, if possible. At the other end of the scale, Joe Francella generally prefers to play on the last team... this usually does not present any difficulty because he is the only person that typically makes this request.
- 3) **One-off Requests:** When we first announce the team assignments, we ask that anyone who has an issue with his or her assignment tell us immediately. In our example, Jenn Mount asked to move to another 3-player team for reasons of her own. Nobody objected, so we switched her right then. Here again, we try to accommodate wherever possible.
- 4) **Late Entrants:** This occurs when players arrive after teams have already been assigned. In our example, Victoria McKeane arrived right around the time that the first teams were teeing off, and she wanted to play with Kathy King (who also arrived late but had been pre-assigned). We had to make a last-minute adjustment to the teams to accommodate them.

We provide this level of flexibility for the overall good of the group. But the impact on the “fairness” of the Team Assignment algorithm will be unpredictable and open to criticism as a consequence. For example, Team 1 now appears to be at a sizeable disadvantage as a result of all the special requests because it features two “D” players and no “A” player. Similarly, Team 6 has ended up with two “A” rated players and so would seem to be at a sizeable advantage:

## GBN Team Assignments

for the Tournament scheduled for Thursday, October 9, 2014

Player Name	Handicap	Rating	Member?	KT?	Payout	CTP Winner?
<b>Team 1</b> 82						
Chuck Stickl	17	B	<input checked="" type="checkbox"/>	1KT		<input type="checkbox"/>
Johnny O'Brien	18	C	<input type="checkbox"/>	1KT		<input type="checkbox"/>
Joe Dutton	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Jenn Mount	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 2</b> 73						
Joe Rodanski	13	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Carter Cowan	13	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Mark Breeden	25	D	<input type="checkbox"/>			<input type="checkbox"/>
Russ Wallace	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 3</b> 59						
Levi Molini	0	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Tim Coleman	18	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Michael McCarty	19	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
John Smee	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 4</b> 63						
Shawn Slavin	9	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Steve Douglas	14	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Eddie Erwin	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Terry Mosley	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 5</b> 68						
Barry Helms	17	B	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Dagan Heaps	14	B	<input checked="" type="checkbox"/>	2KT		<input type="checkbox"/>
Ken Saltink	20	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Greg Strange	17	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
<b>Team 6</b> 62						
Joe Francella	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Austin Metts	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Jack Parker	15	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Brian Dugdale	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 7</b> 55						
Jim Deatherage	16	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Brett Beaver	14	B	<input type="checkbox"/>			<input type="checkbox"/>
Steve Blood	25	D	<input type="checkbox"/>			<input type="checkbox"/>
<b>Team 8</b> 61						
Victoria McKeane	20		<input type="checkbox"/>			<input type="checkbox"/>
Shane Chambers	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Kathy King	21	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>

So which team actually won the tournament? Here are the results:

## **GBN Team Assignments**

*for the Tournament scheduled for Thursday, October 9, 2014*

Player Name	Handicap	Rating	Member?	KT?	Payout	CTP Winner?
<b>Team 5</b>	<b>68</b>		<b>Place: 1st</b>		<b>Team Score: -8</b>	
Barry Helms	17	B	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Dagan Heaps	14	B	<input checked="" type="checkbox"/>	2KT		<input type="checkbox"/>
Ken Saltink	20	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
Greg Strange	17	C	<input type="checkbox"/>	2KT		<input type="checkbox"/>
<b>Team 3</b>	<b>59</b>		<b>Place: 2nd</b>		<b>Team Score: -5</b>	
Levi Molini	0	A	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Michael McCarty	19	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Tim Coleman	18	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
John Smee	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 2</b>	<b>73</b>		<b>Place: 3rd</b>		<b>Team Score: -5</b>	
Joe Rodanski	13	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Carter Cowan	13	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Mark Breeden	25	D	<input type="checkbox"/>			<input type="checkbox"/>
Russ Wallace	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 6</b>	<b>62</b>		<b>Place: 3rd</b>		<b>Team Score: -5</b>	
Joe Francella	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Austin Melts	11	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Jack Parker	15	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Brian Dugdale	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 4</b>	<b>63</b>		<b>Place: 5th</b>		<b>Team Score: -4</b>	
Shawn Slavin	9	A	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Steve Douglas	14	B	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Eddie Erwin	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Terry Mosley	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 7</b>	<b>55</b>		<b>Place: 5th</b>		<b>Team Score: -4</b>	
Jim Deatherage	16	B	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Brett Beaver	14	B	<input type="checkbox"/>			<input type="checkbox"/>
Steve Blood	25	D	<input type="checkbox"/>			<input type="checkbox"/>
<b>Team 8</b>	<b>61</b>		<b>Place: 7th</b>		<b>Team Score: -1</b>	
Victoria McKeane	20		<input type="checkbox"/>			<input type="checkbox"/>
Shane Chambers	20	C	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Kathy King	21	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
<b>Team 1</b>	<b>82</b>		<b>Place: 8th</b>		<b>Team Score: +1</b>	
Chuck Stickl	17	B	<input checked="" type="checkbox"/>	1KT		<input type="checkbox"/>
Johnny O'Brien	18	C	<input type="checkbox"/>	1KT		<input type="checkbox"/>
Jenn Mount	22	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>
Joe Dutton	25	D	<input checked="" type="checkbox"/>			<input type="checkbox"/>

Now that you are completely familiar with the way we assign teams, you are in a position to provide constructive criticism that might help us improve. We are always open to feedback from our Members!