

## Appendix – Computer Science IA – N.R

### Overview

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### Preposition

*A key issue of this writeup was making it understandable to the lay reader. As both the client and myself are golfers, calculating certain values, discussing concepts using jargon and the like were natural. I have tried to explain certain terms where necessary and have included a guide of golf that I hope clears things up to a certain extent. Furthermore, as Mr. {Client} (the client) is based in Munich, Germany, certain variables and calculations will deviate from methods used in e.g. the UK or the USA.*

***Should you not be aware of the game of golf, I very much recommend beginning on Page 8 and attempting to somewhat understand how this 'sport' works. I strongly believe that taking the time to read these pages will aid comprehension hugely. Page 5 should be read before looking at Part C.***

*They say golf is like life, but don't believe them. Golf is more complicated than that.*

*– Gardner Dickinson*

## Appendix Part A

**NB: Should whoever be reading this be somewhat familiar with the game of golf, calculation terms (brutto, netto etc.) are used in German calculations. As this solution is being created for a client based in Munich, Germany, such terms have to be utilized to ensure comprehension on the user's side.**

A.1.1 – Initial Consultations with Mr. {Client}.

### Transcript of Verbal Exchange following our golf lesson. 07.12.15

{Client}: Thanks for taking the time {Me}, this really has become an issue for a lot of people.

Me: No worries, what exactly can I do you with.

{Client}: As I mentioned earlier, a lot of my students obviously don't have the experience that some of you better players have, which is why the whole calculation aspect of the game is a pain the ass for them. You know the whole calculation of brutto, netto, stableford, shots awarded and then how to calculate the new handicap.

Me: Yeah, took me a while to do get used to all the variables.

{Client}: Exactly, and some of the guys aren't the youngest anymore and doing all that math... It would just be easy for a computer to do all the work. Also, it would be great if that application could be used to input putts, fairways and greens in regulation (GIR). Just to add some more on top, if members of our golf club and my students which aren't members could save how they performed and then I/we could look at the history, so how they developed over time, that would be amazing.

Me: Sounds doable, I'll give that some thought and return to you with some success criteria. Is our next lesson fine?

{Client}: Yes, that would be great, thank you very much. One more thing, I cannot express the importance of this thing being fool proof. You know the wide spread in age we have here, so please keep things simple. And also, this will be accessible to the general public, so please don't make it look like a pile of garbage (A.1.1).

Me: I appreciate your confidence in my abilities.

### Transcript of Verbal Exchange following our golf lesson. 09.12.15

{Client}: Before you begin, I had a look at some alternatives (A.1.2); if I would've found something that did the job, we'd just pay for it and save you the time and effort. I considered websites like golfshake<sup>1</sup>, get real golf stats<sup>2</sup> and chart my golf as well as hardware such as HandicapMaster<sup>3</sup> but they are far too complicated to expect some technologically inept person to use. Also, we need to prevent guests from entering impossible handicaps when

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<sup>1</sup> <http://www.golfshake.com/golfscoretracker/>

<sup>2</sup> <https://www.getrealgolfstats.com/>

<sup>3</sup> <https://www.handicapmaster.org/products/index.php>

they enter them themselves, you know what I mean (A.1.4). But ultimately, I want them to be responsible for what they enter, so please don't go through the hassle of checking everything.

Me: I reckoned as much, if you decide to use such an advanced tool yourself, that's fine I guess but they just get way too complicated and require way too many inputs. Here are my criteria for success by the way (I showed him the table seen in Part A).

{Client}: Looks good to me, please, please, please get Criterion A to work, that is most likely going to be the most important thing you must do and I cannot stress this enough.

Me: Alright, take care, see you soon.

### **A.1.3 – Bare minimum of input**

As {Client} mentioned, the user should only have to input the least amount of information possible. For members, this will have to be credentials, score, and Putts, Fairways and GIRs.

Guests will have to select gender, input their current handicap and their score. In both cases this is the bare minimum required to successfully calculate results.

### **A.1.4 – Impossible inputs.**

As Handicaps can be doubles (e.g. 14.3, 28.3, 5.1), the guest using a Numpad to enter his handicap will have to be prevented from entering Handicaps with more than one decimal place, more than one decimal point (two ".").

**N.R**

## Appendix Part B

### B.1.1 – Response to Version 1 (GUI)

#### Transcript of Verbal Exchange after showing printed-out designs. 19.12.15

*Following the acknowledgement of the designs, i.e. looking at them.*

{Client}: They all look fine to me, I very much appreciate that everything looks basic/simple.

*We then discussed the Graphs on the “MEMBER HISTORY” design to determine which graph should offer which information.*

{Client}: I think for the larger graph, we should display Handicap improvement/change, the top right one should feature brutto/netto/total score and the bottom right data on Putts/Fairways/GIR.

*We then discussed the extra labels/calculations shown in Version 2 (particularly the totals on the “CALCULATION TABLE – HANDICAP”)*

### B.1.2 – Response to Version 2 (More complex GUI)

Showing updated printed-out designs to {Client}.

28.12.15

*{Client} looked at the designs/layouts briefly and approved them with minor adjustments. He then got back to work.*

**N.R**

### B.1.3 – Response to Version 3 (Flowcharts)

#### Explaining flowcharts with printed out examples after golf lesson. 02.01.16

*As the flow of the product is fairly simple, {Client} did not require any explanation, we merely discussed that members should be able to navigate across scenes more than guests.*

### B.1.4 – Response to Version 4 (Algorithms)

#### Explaining sample algorithms with printed out examples after golf lesson. 05.01.16

*In simple/plain English, I explained to {Client} the logic behind the algorithms shown in Part B, where we mainly focussed on determining what values should be allowed to be entered (success criteria F).*

## Appendix Part C

[http://www.ega-golf.ch/sites/default/files/epub\\_hcp\\_booklet\\_2016\\_3.11.2015.pdf](http://www.ega-golf.ch/sites/default/files/epub_hcp_booklet_2016_3.11.2015.pdf)

Take Particular Note of 3.10 & 3.12.6

### PART 3 – HANDICAPPING

#### 3.10 STABLEFORD

3.10.1 For handicapping, all *qualifying scores* must be converted to Stableford points based on a *handicap allowance* of 100% of *playing handicap*.

3.10.2 For handicapping, the Stableford points are awarded in relation to the Par at each hole as follows:

Net score on a hole	Points
More than one over Par or <i>No Return</i> .....	0
One over Par .....	1
Par .....	2
One under Par .....	3
Two under Par .....	4
Three under Par .....	5
Four under Par .....	6

3.10.3 For 9-hole *qualifying scores*, 18 Stableford points must be added to the result achieved over 9 holes to obtain an adjusted *qualifying score*, which is recorded on the player's handicap record. 9-hole *qualifying scores* must be clearly identified on the player's handicap record (see Appendix A).

3.10.4 If applicable (see Appendix Z), the *CBA* must be calculated at the conclusion of each round of an 18-hole *qualifying competition* by following the procedure set out in the online *CBA Appendix*.

3.10.5 Any score in a Par/Bogey *qualifying competition* must be converted to a Stableford score by adding 36 points to the player's final result.

**Example:**

2 down	: - 2 + 36 =	34 Stableford points
5 up	: + 5 + 36 =	41 Stableford points
All square	: 0 + 36 =	36 Stableford points

3.10.6 In normal conditions, a player plays exactly to his handicap when he returns a score of 36 Stableford points.

#### EXPLANATORY NOTE: STABLEFORD

The purpose of applying the Stableford point calculation for handicapping is to reduce the impact of a particularly bad score on a hole which does not truly reflect a golfer's playing ability. Other handicap systems use similar measures for stroke control such as net double bogey adjustment.

This restricts the score on a bad hole for a total adjusted stroke play score for handicapping purposes. It also allows a *NR* on a hole in a stroke play competition to be converted to a score for handicapping purposes.

Stableford scoring is a measure of performance against Par; the system was designed so that a player playing to handicap scores 36 Stableford points over 18 holes. The *EGA Handicap System* adjusts handicaps by assessing performance against *Course Rating* so a stroke allowance is included in the *playing handicap formula (CR-Par)* to allow for any differences between *Course Rating* and Par.

#### 3.11 ATTAINING AN EGA HANDICAP

3.11.1 An *EGA Handicap* may only be obtained by a member of an *affiliated club*, an individual member of a *national association*, or an individual player whose handicap is registered and administered by a *national association*.

3.11.2 The maximum *EGA Handicap* is 54 for both men and women.

An *EGA Handicap* may convert into a *playing handicap* exceeding this number.

**Note:** A *national association* may limit *handicap category* 6 to 45.

3.11.3 To attain an *EGA Handicap*, a player must submit at least one Stableford score over 18 holes or 9 holes. It is strongly recommended that the initial handicap attained under this Clause is monitored by the *handicap committee* and if necessary a *general play* adjustment following the procedures set out under Section 3.16 should be applied.

3.11.4 Scores to attain an *EGA Handicap* must be played under *handicap conditions* at the player's *home club* or any other course recognised by his *handicapping authority*. A player who is not a member of an *affiliated club* must play the rounds under *handicap conditions* on a course of an *affiliated club* or any other course recognised by the *national association* subject to any directions by the *national association*. Each score must be signed by a marker and countersigned by the player.

The number of *handicap strokes* the player receives during this round is:

$$\text{HCP Strokes} = 54 + \text{Playing HCP Differential}$$

For a 9-hole round the number of *handicap strokes* a player receives is:

$$\text{HCP Strokes} = \frac{54}{2} + \text{Playing HCP Differential}_{\text{HOLES}}$$

This number can also be determined by applying the maximum *EGA Handicap* to the *playing handicap table* of the course being played.

3.11.5 The initial *EGA Handicap* must be calculated on the basis of the Stableford score returned. If the score was obtained over 9 holes, 18 points should be added to the Stableford score.

$$\text{Initial EGA HCP} = 54 - (\text{Points Scored} - 36)$$

3.11.6 The *handicap committee* may allot a player a lower initial *EGA Handicap* if it has reason to consider that a lower *EGA Handicap* is more appropriate to the player's ability. In exceptional circumstances, a higher *EGA Handicap* may be allotted than that indicated by the initial score.

3.11.7 The *national association* may, at its discretion, require that a player may only be allotted an *EGA Handicap* on condition that he has successfully passed an examination on the Rules of Golf and Etiquette.

3.11.8 A player without a handicap must not be allotted an *EGA Handicap* in *handicap category* 1 without the written authority of the *national association*, or *area authority* if so delegated.

**GUIDANCE NOTE: ALLOTMENT OF HANDICAP**

The rationale for allotting an *EGA Handicap* as soon as the player returns at least one *Stableford* score over 18 holes (or 9-holes) under the provisions of Section 3.11, is to make the handicap system accessible to as many players as possible, in the best interest of promoting golf. It also allows new players to begin monitoring the evolution of their golfing performance immediately.

The procedure set out under Clauses 3.11.4 – 3.11.5 is intended to establish an approximate value equivalent to, or lower, than the scoring of the single round. As players return additional scores it will then be possible to develop a better understanding of their golfing ability. The system provides discretionary authority to *national associations* to set eligibility restrictions for competition entries, based on an *EGA Handicap*, if so desired.

*Handicap committees* are recommended to monitor closely the scoring performance of players with a newly allotted handicap and to apply a *general play* adjustment, if necessary. When players have returned as many as eight scores, it is possible for the *handicap committee* to perform a *handicap review* (see Section 3.15).

From a statistical point of view, directly allotting an initial *EGA Handicap* based on eight scores together with the *handicap review* procedure set under Section 3.15 could provide initial handicaps already in line with the system. However, it is considered infeasible to request such a number of scores from a player who is keen to start using the *EGA Handicap System* as soon as possible.

It is worth noting that the *handicap committee* may allot an initial whole number *EGA Handicap*, other than that calculated based on Clause 3.11.5, if it has reasons to believe that such a handicap better fits the player's ability. Factors to consider include:

- Previous playing history and any lower handicap previously held at the *home club* or any other club. This is of paramount importance.
- Time of year and prevailing weather conditions when cards are submitted.
- Information from peers.
- A handicap held under another handicap system.
- Other relevant sporting achievement.
- The allotment of an initial handicap in *handicap categories* 2 or 3 may be an indication of previous experience where no other obvious evidence exists.

**3.12 ALTERATION OF HANDICAPS**

3.12.1 The recording of *qualifying scores* must be kept as *Stableford* points. The *handicap committee* must record the player's *qualifying scores* in chronological order.

3.12.2 A player's handicap record (example in Appendix A) must contain:

- a. the date of the round
- b. information on where the round was played
- c. the score and type (9-hole scores and 18-hole scores must be clearly identified)
- d. the *CBA*, if applicable (see Appendix Z)
- e. the *qualifying Stableford* score

- f. the revised *EGA Handicap*
- g. such other information as may be required by the *national association*, e.g. *Course Rating*, *Slope Rating*, *Par*.

**Note:** Adjusted (*qualifying*) scores are *Stableford* scores computed by the *handicap committee* based on the result of a 9-hole score, a disqualification or a *NR*, see Section 3.6.

3.12.3 If a player returns a *qualifying score* within his relevant *buffer zone*, his *EGA Handicap* remains unchanged.

3.12.4 If a player returns a *qualifying score* with fewer *Stableford* points than his *buffer zone* or records a *NR*, subject to review by the *handicap committee*, his *EGA Handicap* is increased by 0.1, in *handicap categories* 1 – 5.

**Note:** However, special provisions may apply if such a score is recorded by a player in *handicap categories* 4 or 5 (see Appendix Z).

3.12.5 If a player returns a *qualifying score* above his *buffer zone*, his *EGA Handicap* is reduced by an amount per *Stableford* point in excess of the *buffer zone*, the amount per point being determined by his *handicap category*.

**Note:** Handicap adjustments based on 18-hole competition scores (Clauses 3.12.3, 3.12.4 and 3.12.5) apply after the *buffer zone* has been adjusted in accordance with the *CBA* procedure described in the Section 3.7.

3.12.6 *EGA Handicaps* must be adjusted as described below.

**Note:** Special provisions may apply in *handicap categories* 4 or 5 (see Appendix Z).

Handicap Category	EGA Handicap	Buffer Zone		Stableford-points below the buffer zone: add only	Subtract for each Stableford-point above the buffer zone:
		18-hole Scores	9-hole Scores		
1	plus – 4.4	35 – 36	–	0.1	0.1
2	4.5 – 11.4	34 – 36	35 – 36	0.1	0.2
3	11.5 – 18.4	33 – 36	35 – 36	0.1	0.3
4	18.5 – 26.4	32 – 36	34 – 36	0.1	0.4
5	26.5 – 36.0	31 – 36	33 – 36	0.1	0.5
6	37 – 54	–	–	–	1

\*For *handicap category* 6, subtract one full stroke for each *Stableford* point above 36 points.

**Example:**

If a player playing off handicap 11.2 returns a *Stableford* score of 32 points, his *EGA Handicap* becomes 11.3. If he then returns a *Stableford* score of 42 points, his *EGA Handicap* is immediately reduced by  $(42-36) \times 0.2 = 1.2$  and his *EGA Handicap* becomes 10.1.

3.12.7 When a player's *EGA Handicap* is to be reduced from a higher *handicap category* to a lower *handicap category*, it must be reduced at the rate appropriate to the higher category only so far as to bring his *EGA Handicap* into the lower category and the balance of the reduction must be at the rate appropriate to the lower category.

**Example:** If a player playing off handicap 19.1 (*handicap category* 4) returns a *Stableford* score of 42 points, his *EGA Handicap* is reduced as follows:  $19.1 - (2 \times 0.4) = 19.1 - 0.8 = 18.3$ , taking him into *handicap category* 3, now the reduction is 0.3 per point giving  $18.3 - (4 \times 0.3) = 18.3 - 1.2 = 17.1$ .

## *Appendix Part E*

### *Transcript of Verbal Exchange*

At this point, {Client} has been walked through the final application and has used it himself and with Students. – 20.02.2016

{Client}: Alright, I really can't ask for more, everything I asked for initially has been fulfilled. Should we go through each criteria individually?

Me: Yes, please.

{Client}: So, for criterion A I can say that the application is extremely easy to follow and users, both members and guests have to enter barely any data apart from their performance on the course

Me: Good to hear.

{Client}: For Criterion B, From the different calculations that I have tried, not one has been flawed. Both men and women receive correct calculations for all values.

Regarding crit C, the Graphs on the "View History" Scene are very easy to read and very much help me analyse changes in performance. All values that are entered by members are immediately entered.

With logging in (crit D), members can quite obviously log-in and everything they enter is stored in the file.

For E, when a guest enters their Handicap/Gender, the application automatically transcribes these to the calculation page with correct calculations being the result.

Focusing on F, from what I've tried, the application successfully prevents illogical/impossible inputs from occurring. However, as I've mentioned before, at the end of the day, the guest is responsible for his input.

Lastly, for G, after the guest enters his/her Handicap and gender, the application successfully double-checks by outputting the entered value.

Me: Glad that everything is working.

## **Information on Golf:**

*Comment by the author:*

*The game of golf is second to none in terms of complexity. There are endless calculations, terms, game types etc. which sound like absolute gibberish if you aren't a golfer. Below, I have copied the BBC's simple guide to golf, which can be found at [http://news.bbc.co.uk/sport1/hi/golf/rules\\_and\\_equipment/](http://news.bbc.co.uk/sport1/hi/golf/rules_and_equipment/) - I take no credit for these words and the author retains full copyright.*

### **Scoring:**

**Par is the number of shots (or strokes) a top-class golfer is expected to take to play each hole based on its length and difficulty.**

It also refers to an expected total of shots for the whole round of 18 holes.

Par for a course usually ranges between 70 and 72 shots but most golfers never match that.

Par for a hole is usually between three and five shots, although there a couple of par sixes in America.

If you take four shots on a par-four hole you make par.

But if you do better or worse than that you're introduced to some funny names.

Take three shots on a par-four hole (i.e. one less than par) and you call it a birdie.

Take five shots on a par-four hole (i.e. one shot more than par) and you've got a bogey.

These are just names though.

What counts is the number of shots you play on each hole, which are added together for your total score for the round.

### **Stableford – The type of competition linked to Handicap**

**In this type of competition points are awarded depending on the score for each hole.**

It was designed to speed up play - as soon as a player can no longer score a point he can pick up his ball.

A player scores one point for a bogey, two for par, three for a birdie, four for an eagle and five for an albatross.

You win a competition by scoring the most points overall.

Golf scoring terms

**Albatross:** Three shots less than par

**Eagle:** Two shots less

**Birdie:** One shot less

**Bogey:** One shot more

**Double bogey:** Two shots more

**Triple bogey:** Three shots more

*Contd....*

**N.R**



On an amateur level, if a player takes six shots on a par-four hole but is entitled to a shot because of his handicap, his net score is five.

That would be a bogey which entitles him to one point.

The points can be modified - for instance so the rewards for scores below par are higher.

### ***What is Handicap? - Explanation***

**One of the reasons golf is such a popular game is that a system of handicapping means players of all abilities can play against each other.**

A handicap is a certain number of strokes which a player is allowed to remove from his total score for a round.

Think of a handicap like a headstart given by more skilful players to weaker.

The better the player, the lower the handicap.

It means that good players with a low handicap can play those with a higher handicap and the game can still remain competitive.

A player with an 18 handicap, for example, will subtract 18 shots from his or her score at the end of the round.

**N R**

The handicap system can seem confusing, which is why it is so important to keep your scores on a scorecard so you can work it all out at the end of your round.

Only highly skilled players reach zero, also known as "scratch".

All professional tournaments are played off scratch i.e. without handicaps.

In foursomes, the team's handicap is usually calculated by adding the two players' handicaps together and dividing by two.

### ***How it works:***

**The actual number of shots taken to play a hole or a round is known as the 'gross' score.**

To calculate how well he or she has played, the player deducts his handicap from the total to work out the 'net' score.

For instance, if a player with a handicap of 20 takes 90 shots to go round a par 70 course his net score will be 70 - which means he will have 'played to his handicap' - ie returned a net score the same as par.

COMPETITION THE OPEN										Tee used		
DATE 25 07 02		TIME		Handicap		Strokes		PAR 72 SSS 73				
Player A ALEX				10				PAR 72 SSS 71				
Player B								PAR 73 SSS 73				
Hole	Markers score	White yards	Yellow yards	Par	Stroke index	Score A	B	Nett score	Points	Red yards	Par	Stroke index
1		393	369	4	9	4	-1	= 3		353	4	11
2		330	321	4	17					297	4	15
3		512	501	5	13					457	5	13
4		407	389	4	3					353	4	1
5		388	359	4	11					326	4	9
6		387	373	4	5					352	4	7
7		171	156	3	15					116	3	17
8		409	383	4	1					329	4	5
9		402	374	4	7					348	4	3
		3399	3225	36	OUT					2931	36	
10		301	284	4	8					262	4	16
11		399	365	4	16					337	4	6
12		188	179	3	6					147	3	14
13		363	350	4	18					328	4	12
14		183	166	3	14					143	3	18
15		500	488	5	2					432	5	10
16		405	388	4	12					346	4	4
17		545	530	5	10					469	5	2
18		441	418	4	4					388	5	8
		3325	3168	36	IN					2852	37	
		3399	3225	36	OUT					2931	36	
		6724	6393	72	TOTAL					5783	73	
HANDICAP NETT										Holes won: .....		
										Holes lost: .....		
										Result: .....		

When stroke index is same or lower than handicap take one stroke off score for that hole

You can also work out your score for each hole as you go along as illustrated above.

If you do not have a handicap you can work out what it roughly is by subtracting par for the course from your total.

For instance, if you return a score of 98 on a par 72 course, you will have played to a handicap of around 26.

# N.R

Your handicap score is actually calculated by the standard scratch score but this method gives you a ball-park idea of where your game is at.

IN THIS SOLUTION, NETT SCORE = NETTO (GERMAN EXPRESSION)

**Stroke Index (OCCASIONALLY REFERRED TO AS "VORGABE" IN SOLUTION):**

The 18 holes on a course are generally ranked according to how hard they are using the stroke index.

Usually this means that the hardest hole on a course will be stroke index one and the easiest, stroke index 18.

But, as with many things in golf, it is more complicated than that.

Put simply, the stroke index works in parallel to the handicap.

So if you have a handicap of 14, you should subtract one shot from your gross score at the holes which have been designated as stroke index one to 14.

If you have a handicap of more than 18, there will be some holes at which you can take more than one shot.

For instance, with a handicap of 24, you should take two shots at holes with stroke index one to six ( $18 + 6 = 24$ ).

Although holes are rated by difficulty, the even spread of the stroke index is the most important factor.

If you look at a card the odd numbered stroke index holes will be allocated to the harder of the two sets of nine holes on the course.

There are other factors for deciding the stroke index. You can see these at the English Golf Union's website.

**N.R**

*Glossary for Advanced Calculation – Credit of “Glossary of golf”*

*(Wikipedia)<sup>4</sup> Putts, Fairways, Green in Regulation (GIR)*

**Putt** - A shot played on the green, usually with a putter.

**Fairway hit (FH)** - A fairway is considered hit if any part of the ball is touching the fairway surface after the tee shot on a par 4 or 5. Percentage of fairways hit is one of many statistics kept by the PGA Tour.

**Green in regulation (GIR)** - A green is considered hit "in regulation" if any part of the ball is touching the putting surface and the number of strokes ta{Client} is at least two fewer than par (i.e., by the first stroke on a par 3, the second stroke on a par 4, or the third stroke on a par 5). Greens in regulation percentage is one of many statistics kept by the PGA Tour.

**N.R**

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<sup>4</sup> [https://en.wikipedia.org/wiki/Glossary\\_of\\_golf](https://en.wikipedia.org/wiki/Glossary_of_golf)