United States Masters Swimming
Database Project Swimmer ID Subcommittee Report

Introduction

USMS currently registers members each year and assigns them a registration number that changes on a yearly basis. While this method is sufficient for tracking yearly memberships, other functions within USMS would benefit from an identification system that allowed the organization to track an individual over the course of a potentially long membership within USMS.

Mission Statement

The Purposes of the Permanent ID Subcommittee are to:

1. Determine the form of the registration number including variable and permanent portions;

2. Methods of allocating numbers should the Database committee develop a scheme which required the allocation blocks of numbers to LMSCs

Mission Objectives

1. The subcommittee will provide a scheme for assigning yearly registration numbers which will include a variable and permanent ID portions.

2. The subcommittee will provide a scheme for allocating blocks of numbers to LMSCs should the overall database system design require this function.

Registration Numbers

USMS offers two types of memberships: full and one-event. Currently USMS assigns a registration number to each member of the organization. Full members receive a membership card with the registration number while one-event members receive neither. The full member's number is used to verify membership within the organization for the purpose of participating in its functions especially workouts and competitions. The full member's registration number consists of an 8 digit code of the form LLY-NNNNN where LL is the LMSC number, Y is the last digit of the current registration year and NNNNN is a sequential number assigned to a swimmer by the registering LMSC. One-event members are internally tracked with a similar number except that the first character of the sequential number is replaced with a %. The registration number of each member cannot be used to track individuals from year-to-year unless USMS develops a linked list tracing back through the series of registration numbers assigned over the course of membership. USMS has not done this and any attempt to do this *ab initio* would be fraught with complications introduced by formal name changes, use of nicknames, changes in preferred names and the like. An alternative method of achieving the goal of tracking members over time would be to assign an ID that would be permanently assigned to an individual. The form of that permanent ID must be well thought out if the ID is to last as long as the organization anticipates being viable.

Currently, registrars in the various LMSCs have a number of options for performing their duties of accepting members and assigning membership numbers. A majority of the registrars use a program provided by USMS for this task. However, several do not. As can be surmised from the discussion below, the option to use software other than that supplied by USMS will no longer be available.

Form of the New Registration Number

Several, possibly competing, requirements are important in developing the form of the new registration number. These include: The registration number should:

1. be as short as possible;

2. have the capacity to assign unique identification to all individuals who become members over an extended time period;

3. vary slightly from year to year in order to verify the currency of the membership;

4. include a portion which is permanently assigned to the individual;

5. identify the LMSC in which the member is currently registered;

6. have an internal check to insure validity from both a data entry and fraud perspective.

The current registration number includes the LMSC number and the last digit of the current registration year. This scheme appears to be working and thus need not be changed. The sequential number portion of the current registration

number is not large enough to handle even the total number of individuals registered in the last decade. Expanding the size of the sequential number would provide additional ID numbers but would make the registration number too long. However, converting the number to an ID that can contain both numbers and letters greatly expands the number of ID's that can be assigned with a given number of characters. Thus, including the digits and most of the alphabet (excluding those capital letters which are easily confused with numbers, O, Q, I, S) provides 32 characters. A four digit ID provides 1,048,576 numbers while a five digit ID provides 33,554,432 combinations. Given the current growth, renewal and non-continuous re-registration rates, a four digit ID would run out of numbers in about 30 years assuming that we were 100% efficient in assigning numbers. (That is, we do not suffer the problems the telephone companies suffer in assigning telephone numbers which has lead to the increased number of area codes in use in spite of large blocks of numbers remaining unused.) Thus, a five digit ID would appear to be necessary if the organization does not want to change the scheme in the next 20 to 25 years. A five digit ID should last approximately 100 years under the same assumptions.

One of the advantages of assigning a new registration number on a yearly basis is the fact that it is more difficult for someone to fraudulently use a registration number since the individual does not know if the person legitimately assigned the number will be participating in the same event as he/she. Therefore, the new registration number must contain a check character that can be used to validate the authenticity of the registration number. The check character would also aid in validating data entry, which becomes more important as the use of the permanent portion of the ID becomes a reality. Several requirements for the check character have been identified including that it should not increment in an obvious fashion with either an increase in the value of the permanent ID or the year. For example, as a swimmer re-registers in consecutive years, the check character should not increase from 0 to 1 to 2. Additionally, the check character can detect single errors in data entry including the entry of an incorrect value or a transposition of adjacent characters. The method used to calculate the check character should remain closely held with only select USMS personnel and programmers needing to generate or validate the check character having access. Thus, the method used to generate the check character is not a subject for this report.

The new registration number will therefore be of the following form: LLYC-PPPPP where LL and Y represent the LMSC number and current registration year respectively. PPPPP is the individual's permanent ID and C is the check character. This separation of the variable portion (LLYC) from the permanent ID will simplify our use of the permanent ID as well as ease our educational task of having the membership relate to and use the permanent ID.

One-event registrations are currently assigned a number for the purpose of internally tracking these members for purposes other than those requiring a permanent ID such as accounting for their membership fees and adherence to the limit of one such membership per year. Thus, the form of the ID need not conform to the above permanent ID scheme. The current scheme of LLY-%NNNN where the characters retain the meanings defined above is adequate. (The % is literal.) The number portion can restart within each LMSC on a yearly basis as is currently done.

Allocation of Permanent IDs

The method of assignment of permanent IDs will depend upon the exact implementation of the registration system. If the registration system is on-line with registrars interacting directly with a central system, then allocating ID numbers simply involves selecting the next available number. If the registration system maintains local copies of the LMSC database with periodic updates to a central database, the system must insure that no duplication of IDs occurs. One method of accomplishing this would be to allocate a block of ID numbers to each LMSC. The LMSC would then allocate numbers sequentially until they run out at which time they would receive a new block of numbers. If this scheme is adopted, numbers could be allocated in the following manner:

LMSC Size	Block Size
Up to 300	2000
301-600	5000
601-2000	20000
2001 +	50000

Detection of Duplicate Assignments

The software system developed to register individuals and maintain the database must be able to detect multiple assignments of permanent IDs to a given individual. If the system does not prevent multiple assignments with a high degree of accuracy, the purpose of having a permanent ID will be defeated. Part of the process of minimizing this problem must be education of our membership. However, algorithmic methods must be developed to catch attempts to

assign multiple numbers. It is anticipated that the developer along with knowledgeable USMS members who have experience with this issue will develop such algorithms.

Summary

The Permanent ID subcommittee recommends the following:

1. The USMS Full-Membership Registration number be changed to include a permanent ID. The form of the number should be LLYC-NNNNN where LL and Y represent the LMSC number registering the swimmer and Y is the last digit of the registration year. NNNNN represents a alphanumeric permanent ID assigned to the individual and C represents a check character algorithmically derived from the remainder of the registration number.

2. One-Event registration numbers, used for internal purposes only, maintain its current form of LLY-%NNNN where LL and Y have the same meaning as in 1 above, % is a literal character used to distinguish the number as a one-event membership and NNNN is a sequential number assigned on a yearly basis.

3. The algorithm used to determine the check character in the full-membership number be developed so that it does not sequence in an obvious manner from year-to-year or with sequential ID numbers. The algorithm must remain secret if it is to perform one of its functions to minimize fraud.

4. The registration systems must be designed to catch a very high percentage of attempts to assign more than one number to an individual.