**ORGANIZATION OF DOCUMENTS ON BATCHER’S MEMORIAL WEBSITE**

It is important to have this website organized in a way that researchers and industrial computer engineers will find it easy to use. The “ease of use” of a website by the expected users of this website will be much more desirable than having a fancy website. Having a logical organization will allow these expected users to locate the information they want much easier.

I will use the term **associative computing** to include all information related to associative computers, including their architecture, software, applications, and computational models.

As I mentioned my earlier emails, extensive work on associative computing has been done at **Goodyear Aerospace**, **Loral**, and the department at KSU housing the computer science program. This was initially the **Department of Mathematical Sciences** and in 2001 became the **Department of Computer Science** at KSU, and at Loral. However, Jerry Potter, Ken Batcher, and Will Meilander had switched from working at Goodyear Aerospace to Kent State before the Department of Computer Science was created.

If we can get a pointer to this site in Wikipedia included in their discussion of Ken Batcher’s contributions, then we should get a large number of people to take a look at this site. Many of these will look primarily at the portion of the site that focuses on Ken Batcher. However, I expect quite a few computer professionals who are interested in the efficiency of different computer architecture on a wide range of applications, identifying a new architecture that can handle specific applications more efficiently, various types of SIMDs that have been built in the past, and in associative computing to take a much closer and more frequent look at this website. In my current research with Professor Gokarna, we expect to show that the efficiency this associative processor can handle large real-time applications like air traffic control extremely more efficiently than other architectures, including especially cluster type of hardware. We plan to mention the Batcher Memorial Webpage in a high profile location in our future papers in the area of associative computing.

One thing to remember is that for professionals who will on occasions use this site heavily, the most important thing want in a site like this whether the site is easy to navigate (i.e., doesn’t require a lot of clicks to locate items) and whether the material is well organized, so that they can quickly locate the information they are searching for. I feel that all of the documents we are currently planning to put on this site can be divided into two natural groups which will allow the different people using the Batcher Memorial Website to more quickly narrow their search for the information they are looking for. These two groups are

1. Manuals and other reference type documents which provide reference material about how to write and execute programs, maintain and correct problems for the STARAN, ASPRO, and MPP and how to use standard software packages created for each of these SIMD computer systems. The work of creating these documents was done strictly at Goodyear Aerospace and Loral.
2. Reports on research involving these architectures, important applications for them, software for these applications, etc. These include research papers, publications, theses, dissertations, and books. This work was done by two different groups:
   1. Work done by the professional staff at Goodyear Aerospace and Loral.
   2. Work done by the computer science students and faculty at Kent State University

With regard to the first group, it should be much easier to use this reference material if it is broken into three subgroups, with the documents for each of these SIMDs (i.e., STARAN, ASPRO, and MPP) being listed separately.

In order to give both Goodyear Aerospace (which later was acquired by Loral) and Kent State credit for the large role they had in this research, I think it is important to break up the second set of documents into these two subgroups 2a and 2b listed above. Kenneth E. Batcher, Jerry Potter, and Will Meilander all made important contributions to both of these two subgroups. In fact, if they had not come to Kent State, the computer science associative computing research group in computer science would never have been created.

The building and designing software and applications for the STARAN, ASPRO, and MPP stretched over a period of more than 30 years at Goodyear & Loral. During this time, the STARAN went through multiple early versions that later were viewed as more of a “pre-STARAN” architecture and there were at least 3 versions of the later versions. Documents that apply to some of these versions may not apply to earlier or later versions. Also, the capabilities of these systems also changed as new software that extended what each of these three systems could support. As a result, the documents related to the use of these computers will a lot easier to understand if the documents in all lists **appear as close as possible to order they were completed,** as this will result in documents that were completed around the same time being close together in these lists. In some cases, it is difficult to determine even the year a document was completed. However, an approximate time of completion can usually be obtained by looking at the dates given for the references listed or by quickly scanning for dates given inside the document.

A spreadsheet titled “**STARAN, ASPRO, MPP & Research Papers**” is attached to the same email as this WORD document. It is an extension of Ken and my earlier spreadsheets containing a list of the STARAN, ASPRO, and MPP documents that were carried to the KSU Digital library for digital coping. I have added an additional sheet to this spreadsheet titled “Copies of Goodyear/Loral and Early KSU Research Papers”. This is a group of papers on associative computing that I plan to carry (or have someone else carry) to the digital library to be copied after Virginia Dressler has time to deal with this. However, I have scanned copies of these papers that I can send you electronically. They could serve as temporary digital copies (but these copies are definitely lower quality and the PDF files are not searchable)

I have used a highlight scheme to identify which subgroup I feel each document in this spreadsheet belongs to. Documents in Group 1 (programming and system related manuals) have no highlight (i.e., appear in white). However, the documents in this group belong in one of the subgroups: STARAN, ASPRO, MPP. Since the document name will identify which subgroup each item belongs to, I did not include a highlight color for each system. Research documents produced by Goodyear or Loral have a light green highlight. Research documents produced at Kent State have a light blue highlight. I use a yellow highlight to call attention to important facts. I have proof-read these groupings a couple of times, but please check for what appears to be an error when using this grouping scheme. With such a wide range of documents, errors are certainly possible. I hope that Ken will be able to proof at least the MPP documents, as he is more familiar with them than I and may feel some need to be grouped differently – or that another grouping scheme would be better.

Next, I will discuss my suggested grouping scheme for publications, unpublished research projects, research proposals, white papers, dissertations, theses. First, these documents should be partitioned into two large sub-division: the documents produced at Goodyear or Loral (green highlight) and the ones produced at Kent State (light blue highlight). Since Goodyear/Loral do not have any dissertations or theses, the simplest scheme is to put all of the green highlighted documents into one group. A useful refinement of this would be to put the journal papers and the book-chapters papers in the green highlighted documents into one group and the rest into a second group. Usually, journal papers and book-chapters are regarded as containing more high value material than ordinary publication.

With the blue highlighted documents, the dissertations should be put in one group and the theses should be put in a second group. The remaining documents should be treated in the same way as in the above paragraph. Some of the material in theses and dissertations will be included in publications. However, the dissertations and theses provide a lot of detailed information that cannot be included in a published paper. Also, not all of the results in these documents are included in subsequent publications.

Some of the documents produced at Kent State will be listed in the spreadsheet we just discussed. However, most of them the Kent State documents are not on the spreadsheet and these will be discussed next. They can be added to the groups created the light blue highlighted documents above.

An third document that is attached to the same email as this WORD document is the portion of Professor Walker’s vita (or CV) that lists all documents related to his research work in associative computing. These consist of all of his publications, sponsored dissertations, and sponsored theses that are related to associative computing. All of these should be put in the appropriate group discussed above for the light blue highlighted documents.

A fourth document that is attached to the same email as this WORD document is a list of many of Jerry Potter’s publications at Kent State University in the area of associative computing. This attachment is a document that Jerry sent me. These are NOT all of Jerry’s publications at Kent State, as at least two additional ones were identified in the spreadsheet discussed earlier. Also, Jerry had publications while at Goodyear Aerospace, as some were identified in the spreadsheet discussed earlier. I suspect there are additional publications that he authored or co-authored while at Goodyear. Jerry did not provide me with the names of any thesis or dissertation he sponsored, but he sponsored several theses and dissertations while at Kent State. I will provide you with the names of a few of these in the attached information from my vita.

A fifth document that is attached to the same email as this WORD document is information from my vita (Johnnie Baker) that lists all of my publications, sponsored dissertations, and sponsored theses that are related to associative computing. Also, in separate lists, I have included the names of the dissertations and theses that were sponsored by Jerry Potter and theses that were sponsored by Will Meilander. The reason that I have this information on my vita is that I was a member of the defense committee for some of the theses and dissertations they sponsored. However, I am fairly certain that there are other theses that both Will and Jerry sponsored that are not in the above lists. Likewise, I am fairly certain that there are other dissertations that Jerry sponsored that are not included in my list.

I have not attempted to get a list of the papers that Kenneth E. Batcher wrote or the dissertations that he sponsored. (I don’t think Ken ever sponsored a master’s thesis.) I assumed that most of these have already been located by the capstone project students who worked on this web project either this semester or last semester. There are 2-3 Ken’s papers that are listed on the second page of the spreadsheet mentioned above, so these need to be checked to see if they are included. Also, one of the spreadsheets (“KWB Papers”) that Ken W. Batcher prepared includes an early vita for Ken, so this needs to be checked for overlooked items. Also,the KWB-MPP webpage site includes the “Arnstein Award Nomination” document Also, since Jerry Potter and I worked together to nominate Ken for the Seymour Cray award”, I have somethings that should be included about that award. You need to be aware that Ken did not bother to list all of his publications on his personal webpage, but probably listed only the ones he considered to be the most important ones. However, we should list all the papers, etc. that we can find.

There will probably be a question as to whether Kenneth E. Batcher’s research papers and other documents should be mentioned only in the “Batcher” portion of the Kenneth E. Batcher Memorial Website, or if they should also be included with the “Goodyear/Loral Publications, Research Papers, etc.” and included with the “Kent State University Publications, Research Papers, etc.” The correct answer I feel is that they should be listed BOTH PLACES. They certainly should be in the “Batcher” part of this website. However, we are also trying to include all the work that was done at Goodyear/Loral and at Kent State University.

Also, Will Meilander passed away in December 2018 and I do not have a vita for him. I suspect that he sponsored more theses than the ones I listed on my partial vita. Likewise, I suspect that he authored or co-authored additional documents that we do not know about while at Goodyear. Probably most of his publications at Kent State were also co-authored by either Jerry Potter or I. At least one of the documents he authored or co-authored while at Goodyear is listed in the spreadsheet I discussed above. I think that the Department is supposed to keep the last vita of all past professors. If so, then we would need to check with one Marcy Curtiss to see if we could obtain the copy of Will Meilander’s and Jerry Potter’s vita that was in their departmental file when they retired. If they have it, these files would probably be filed in a box or file cabinet in a crowded storage room.

There is another way that Marcy Curtiss (our secretary in charge of student affairs) can probably locate the dissertations and theses sponsored by Ken Batcher, Jerry Potter, and Will Meilander.

I think that Marcy has information about most or all of the dissertations and theses that have been written in this department. However, she cannot do this while working from home during the shutdown. Marcy has been in her current position since the Department of Computer Science was formed (2001). However, Professor Walker thinks that she took time to capture the information about all of the computer science dissertations and theses that were written before she was hired.

Probably the quickest way to find the dissertations that were sponsored by Kenneth Batcher and Jerry Potter and the theses that were sponsored by Jerry Potter and Will Meilander would be to do a web search of our library records or to use the Ohio Link. In particular, Ken W. Batcher felt that this could be easily done. I am sure Virginia (Ginnie) Dressler at the KSU Digital Library could also provide information about this when she again regains some free time.

I will continue to see if I can get more information from Jerry Potter concerning his publications while at Goodyear Aerospace and the dissertations and theses he sponsored at Kent State. However, I have asked him for this information a couple of times and he hasn’t responded. It may be that this information isn’t currently easy for him to locate or is in a format that he finds difficult to work with.

Again, in the final posting of these various documents on Batcher’s memorial website, I think it would be better to post all of the documents in the same group in the order they were completed – or as close an approximation to this as possible. I suggest that all of the sponsored dissertations be listed in the order of the term they were completed. Likewise, I suggest that all of the theses be listed in the order of the term they were completed. The information about dissertations and theses should indicate the sponsoring faculty member’s name.

One additional important topic needs to be discussed, and that is the list I sent to the capstone project workers this semester concerning publications written at KSU involving associative computing at <http://www.cs.kent.edu/~parallel/papers/papers.html> This page probably has papers that are NOT INCLUDED ON THE EARLIER LISTS I MENTIONED. Faculty often forget to add some of their publication to their vita. Also, there is a copy of a near-final version of almost all papers at this site, which can be attached to the listing of these papers on the Ken Batcher Memorial Website. Professor Walker has either overseen or managed the Departmental Website a good portion of the time he has been at Kent State. He warned me that feels we should capture all of the information we want from this website as soon as we can, as he expects it to become in accessible in the not-to-distant future. Note that one advantage of listing all documents in each list in the order of their publication date is that this makes it easy to eliminate duplicate listings.

While the formats used in the many bibliographical listings are likely to differ quite a bit, the most important thing is that the listing of each document should include enough information to located the published version of it using the internet. While it is preferable the format used for all documents be the same, this is much less important than that we include all of the documents we are able to locate. Researchers are much more interested in having the information available than in having a uniform format.

One important area of Ken Batcher’s contributions that we have not mentioned is his two parallel sorts: The odd-even merge sort and the bitonic sort. Donald Knuth has consistently included them in his encyclopedic book series. I forget which, but they are in his volume 1 or 2. In Wikapedia, they listed an article by Don Knuth in which he stated (in a more precise way) that while the odd-even sort was not optimal, it was so close to optimal that it was almost impossible to build a computer with a large enough memory so that this “lack of being optimal” would be noticeable. While we do not have time to add another topic we are covering, when we get a chance to do so, we should at least mention his contributions in this area and provide a pointer to at least one or two references.

I realize that there won’t be time to do the work suggested in this document this semester since the semester almost over. However, the information I am sending you needs to be stored in a location where it can be preserved until someone has time to post these documents appropriately. For example, it may be better to post unorganized lists on the website temporarily than to have this information kept in a folder that may be lost.

There are several places where more work has to be done before this website can be considered finished. This additional work will have to be done by either Ken or I. Below is a list all of these essential jobs that I currently recall in the itemized list below:

1. Earlier I sent you a link <http://youtu.be/IiNwZhdKbVs> to a video of the STARAN demonstrating its ability to performing air traffic at Dulles International Airport. I provided information about this video earlier, but can send it again, if needed. Anyway, there is still a possibility that with Ginnie’s help, we may be able to retrieve a much longer video of this.
2. We need to move the original copies of the manuals for the STARAN, ASPRO, and MPP to a repository where it can be preserved indefinitely. Candidates for this are University of Akron’s Goodyear repository, Kent State Library, Computer Science History Museum, and the Smithsonian Air and Space Museum at Dulles Airport. This Smithsonian museum has the MPP on display. We have multiple copies of a several of the original Goodyear documents, so these will probably go to different locations.
3. We need to visit the Univ. of Akron Goodyear Repository and find what items they have for the ASPRO, STARAN, and MPP. Then a summary of their holdings needs to be added to the webpage with pointers and information about these items can be viewed.
4. We need to get an old 10 inch tape reel with a copy of the ASPRO emulator that Goodyear created in order to allow programs to be developed for the ASPRO offline. We need to get this tape to the Computer History Museum to see if they can restore it. Two experts have told me they feel sure that this museum can get the simulator off this old tape. An emulator is a very precise simulator that is cycle-accurate and can not only execute ASPRO programs, but give its exact ASPRO running time on a specific data set. If they can restore it, I want to get a copy of it, as our systems group can probably create a working copy here. This will create a real need for the ASPRO programming manuals. We will need to add information to the website about this, after this work is at least partially finished. Use of this emulator will require the programmers to use the programming manuals in our ASPRO collection.

Much of completion of the current Batcher Memorial Website may have to be done by Ken W. Batcher, as the creation, extensions, and addition of additional material for formal websites like this requires skills that I do not currently have. While I could probably gain such skills, I need to instead work with Ken to complete items A-D above and also spend more time on my research. The completion of the key parts of the Batcher Memorial Website should not be postponed for any substantial amount of time. Ken has a very time-consuming position and it is urgent that I to get back to work on completing what I feel is extremely important research that I hope will establish that if the STARAN or ASPRO were built today using today’s technology, then it will be able to do a much better job of performing a number of important and demanding tasks like air traffic control better than the supercomputers that are used today – primarily due to an extremely efficient architecture that was developed by Kenneth E. Batcher.

I don’t know if the amount and type of the remaining work that needs to be done would justify the appointment of a third group of students who want to do this as their capstone project. I would like to hear the opinion of the students currently working on this project. I am not sure if next semester will be anything like normal, but hopefully it will. The move to online teaching has made this project much more difficult for the current set of students.