

## **Cost Effectiveness of the Class Pass**

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**Abstract** The AC Transit Class Pass at UC Berkeley, an unlimited access pass to the Alameda County public transportation system, is provided to students of the University for a mandatory fee. This study examines the costs and benefits of the Class Pass system. Student focus groups and data from student surveys were used to determine student attitudes and modal choices. Emissions statistics, average operating costs, and parking data for cars and buses, as well as the change in amount and route of buses since the institution of the Class Pass are also used in quantifying the benefit to students, AC Transit, the community, and the environment. Results show that the monetary cost to the student body as a whole is greater than the average student benefit, but because of varied student attitudes, an increase in the mandatory fee could affect willingness to pay. An overall benefit to AC Transit as a result of guaranteed income is shown, but is somewhat diminished by illegal Class Pass sales. The benefits to the environment and community are generally positive because of decreases in car use with no significant increases in number of buses, resulting in fewer emissions. Implications of the study indicate that the Class Pass may be more beneficial if it was an optional fee, where only users would pay for the service.

## Introduction

The AC Transit Class Pass was instituted for UC Berkeley students in 1999 (Heagerty and Tanphanich 2003). It is one of many unlimited access programs being implemented by universities across the country (Brown et. al 2001), providing students with the unlimited use of the buses in Alameda County as part of student fees. Currently, for a mandatory fee of \$37.20 per semester (\$34.20 in 2001 and 2002) the student receives a Class Pass sticker for their ID card. The system was instituted as a service to the students and because of the success of similar systems at other schools. One of the principle reasons many schools establish such systems is to provide incentive for using the public transportation system and thereby minimize the use of personal transportation by students in urban areas without the infrastructure to support a large quantity of vehicles (Brown et. al 2001). While generally hailed as a success because 88% of the students voting in the referendum (30.9% of students) voted to implement the pass in 2001 ([http://bearfacts.berkeley.edu/election\\_results.html](http://bearfacts.berkeley.edu/election_results.html)), the costs and benefits of this fixed fee have not been studied. This study examines the transportation outcomes of the Class Pass to determine whether or not this fee is benefiting the groups that it is affecting, including UC Berkeley students, AC Transit, the surrounding community, and the environment.

The validity of unlimited access systems has been studied at UCLA (Brown et. al 2001), and the success of systems has been studied at many universities (Brown et. al 2003, Panayotova 2000, Daggett and Gutkowski 2002, EPA 2003, Transportation Research Board 2003, Garder 2002). These studies have revealed a positive impact for these universities and communities. UCLA's program was considered a success based on the change in commuter ridership, with a decrease in commuting by 20% and an increase in student bus use by 56%. Parking demand was also taken into account, with the waiting list decreasing by over 1000 students (Brown et. al 2003). Non-commute rides, costs and benefits to Blue Bus (UCLA's transit system), and the benefits to the community were also taken into account in the study.

Because each campus and transportation system is unique, whether or not the unlimited access system is efficient for a particular school has to be studied individually. The extent of the transportation system, other modal options (i.e. biking, driving, or walking), layout of the school, and attitude of the students can all affect the success of an individual program. While surveys of whether or not the students are generally satisfied with the Class Pass system have been implemented, there has been no study assessing whether the system is achieving decreased

driving to campus or reducing the cost of attending college, which have been used as criteria for assessing unlimited access programs (Brown et. al 2001), or how the surrounding community and environment are affected. These are questions that will be examined in my analysis of the cost-effectiveness of the Class Pass.

In analyzing the costs and benefits of the Class Pass, I expect that there will be some similarities and differences between Berkeley and other schools, such as UCLA. Some possible differences can come from the attitudes of students, the infrastructure of the transportation system, or the topography of the campuses. The preferences at UCLA were not looked at, but the steep incline at UC Berkeley increases the probability of students using the bus for short distances. I expect Berkeley to be similar to UCLA in costs and benefits to AC Transit, and benefits to the community because these would not be highly different as a result of the topographical differences. On the other hand, I expect to see a difference in the commuter and non-commuter rides because of the campus layout and community. I expect that there are fewer commuters in Berkeley and that more people now take the bus for short distances in place of walking or biking because of the incline of our campus.

After instituting the pass, increased ridership by students prompted AC Transit to expand and improve its system (Cole 1999), however a large portion of the rides are non-commuter (survey 2001). Many students would choose the cheaper and more environmentally friendly options of walking or riding bikes to substitute the bus system if the Class Pass was not a mandatory fee (survey 1997). Rodriguez and Joo (2004) suggest that development of transit systems needs to take into account modal choices of the users, finding that the infrastructure influences which mode is preferred. They found that preferences for biking and walking decrease in sloped areas, which could explain the increased use of the AC transit system when it became a mandatory flat fee. However, an increase in use of the bus without a corresponding decrease in car use would render the program less successful. If the service is being underutilized or is being used primarily in place of walking or biking, the student fees could be subsidizing an unjustified expansion of public transportation, and the goals of decreasing congestion and pollution are not necessarily being met.

The subsidization of transit systems can be highly inefficient, as Savage (2004) discusses. In his examination of the Chicago Transit Authority, Savage found that if there had been less subsidization of the system in the 1960s the system would have kept costs lower and could have

increased productivity of the system. Savage also reported that increasing fees for use, rather than decreasing serviced routes decreased social welfare. AC Transit currently faces a budget deficit. The Class Pass system, while not making a large profit for the AC Transit system, does provide them with a steady \$1.2 million (Heagerty and Tanphanich 2003). If this revenue allowed them to increase service and implement new buses, rather than decreasing service routes, it could create an increase in emissions to the environment.

Cost effectiveness is one method to evaluate the effectiveness of the Class Pass program. Specifically, does the program efficiently achieve the common goals of other similar programs, and meet student needs and expectations?

## **Methods**

To determine if the Class Pass is cost-effective in meeting the expectations of the students and their willingness to pay, decreasing car use more than walking and biking, decreasing demand for parking, and doing more good than harm for traffic and the environment, I looked at Class Pass survey results from 1997, 2001, and 2002. In 1997, the questions were a part of the Student Housing and Transportation survey, in 2001 the survey was optional when picking up the Class Pass, and 2002 students requesting their Class Pass online had to fill out the survey as a part of the request, while students picking up the pass in person had the option to fill out the survey in line. The surveys include data for pre-Class Pass modal options, approximate frequency and distance per ride, amount of people picking up and using the Class Pass, how often people drive to campus, and how the Class Pass affects frequency of car use. The cost of car use for students was estimated using United States averages for car costs (AAA 2004), and parking permit demand was examined to try to ascertain the amount of students driving to campus. Focus groups were held to discover the attitudes of students towards the Class Pass, how much individuals are willing to pay, what primary modes of transportation students use, and why.

All focus groups were held on campus and participants were recruited through emails to various student groups and classes to get as wide a variety of students as possible, including Class Pass users and nonusers. I facilitated a discussion about the Class Pass with groups ranging from five to ten people, and recorded the sessions for further analysis. Questions included student perceptions and expectations of the Class Pass, their willingness to pay for it,

how often and how far they travel on the bus, how the Class Pass affects their modal choices, how often they use their car, and how they think the Class Pass affects the environment or the surrounding community. I received verbal consent for the anonymous use of participant responses and for those responses to be recorded. Because participation was voluntary and compensation was minimal, it is highly likely that the focus groups self-selected for students with an interest in the Class Pass or public transportation in general. Fortunately, interest in the Class Pass could come equally from satisfied or unsatisfied students, providing a good cross section of both users and nonusers.

The Class Pass surveys in the past have not been as representative of the overall student body AC Transit would have liked, with the sampling population limited to students willing to fill out a survey while picking up a Class Pass: in 2001 approximately 25% of the population and in 2002, approximately 50% of the student population. While these surveys do provide valuable information, they needed to be balanced with other data collection. The focus groups, on the other hand, provide a balanced representation of the attitude of both users and nonusers, but do not provide the quantitative information contained in the survey. To obtain an accurate picture of what students value and how much they are willing to pay for the Class Pass, I examined both sets of data.

I also examined the monetary and environmental costs of both car and bus use. Parking costs have been a key indicator for success of other Unlimited Access pass programs (Brown et. al., 2003), and provide insight into how much car users are paying each year. Other costs, collected from various sources, include the average cost of gas, maintenance, insurance, and emissions per year. These were compared to the costs of bus use with individual rides, using the Class Pass, and using the Bear Pass. Difficulty in obtaining exact records from AC Transit on changes both in bus routes and number of buses since 1997, prompted use of bus driver interviews. Bus drivers operating key lines, determined by the Class Pass surveys, were asked a series of questions about changes they have seen in quantity of buses and bus routes in the community and around the campus. Bus emissions was estimated from studies done on the newest type of AC Transit bus (Pelkmans et. al 2002) and average miles driven in an urban bus each year (Air Resources Board. 1995).

My analysis is principally qualitative because of the nature of focus groups. Collection of a statistically significant sample of the student population through focus groups is not possible, but

this component of the research provides important qualitative information regarding student attitudes and behavior that cannot be obtained from the surveys. Comparisons between the focus group data to the survey data, parking costs, and AC Transit’s costs and benefits yield interesting insights into the value of the Class Pass to the various stakeholder groups, but do not generate quantitative information. Scenarios projecting how the balance between cost and benefit for students, AC Transit, the community, and the environment would change with different modal preferences by students help to place the research into context.

These methods will help explain whether the Class Pass is cost-effective for students by telling how they value of the Class Pass, which is compared to use, distance used, and the modes that would be used in place of taking the bus. Monetary costs are also examined for students including car costs of parking, gas, maintenance, and insurance. The costs and benefits examined for the AC Transit system include increased revenue, losses due to fraud, and changes to their system from new buses and routes. Environmental and community costs and benefits, including emissions caused by cars and buses and potential effects of service changes were also considered. Together these values should be good predictors of whether the Class Pass is cost effective, or if it needs to be changed.

<b>Students</b>	<b>AC Transit</b>	<b>Environment</b>	<b>Community</b>
Willingness to Pay Convenience Cost of Bus Use Cost of Car Use	Class Pass Income Cost of Extra Buses Fraud	Change in Car Use Change in Bus Use	Change in Emissions Change in Amount of Service Atmosphere Created by Students

Table 1. Costs and benefits examined to determine value to stakeholder groups.

**Results**

The monetary value to students for the Class Pass was approximated using United States averages for car costs per year from AAA, displayed in Table 2. These numbers were then compared to the costs to students of using AC Transit, whether paying for it in individual trips, as a mandatory fee (Class Pass) or as a voluntary fee (Bear Pass), in Table 3.

	Car Cost
Gas	\$975
Maintenance	\$915
Parking	\$936
Insurance	\$1,603
Total	\$4,429

Table 2. Approximate costs for a car for one year.

Individual Fare	\$1.50
Approximate # Trips/year	180
Total Cost for Averaged Individual Trips	\$297
Class Pass Cost	\$74.40
Bear Pass Cost	\$240

Table 3. Approximate costs of bus use for a year. Number of trips per year estimated using the 2001 Parking and Transportation survey, using the median estimate of 5 trips/week.

Results for how students value the Class Pass were then collected, and include a test focus group and three actual focus groups. From these focus groups I learned that many students appreciate the convenience of a Class Pass, regardless of the cost. Some examples provided for “convenience” included not having to carry money and speedier admittance to the bus. “When most people who get on the bus have a class pass, it makes getting on the bus much quicker and more efficient because people don’t have to find correct change and put it in the machine,” one student mentioned during a focus group. Several students, particularly in my test focus group, expressed their willingness to pay up to double the current price, whether or not they use the bus frequently enough to be monetarily compensated. However, in my later focus groups, this was not a unanimous sentiment. These students felt that they do not use the Class Pass frequently enough to justify the cost, and would walk to campus if it was not a mandatory fee. “I use it a lot and like having it, but if I didn’t have to pay for it, I would not use it. I use it because I am lazy and since I have paid for it I figure I might at well take the bus, even if it is only 6 blocks or so,” one student commented. Safety was also noted as a benefit: “If someone is stuck somewhere then they can use their class pass in order to travel more safely.”

Other interesting information in the focus groups came from modal choices. Many students reported that they use the bus only if they see it coming, they will be late if they do not take the bus, in inclement weather, or when feeling tired or lazy. “When the bus is coming, I take the bus. When there’s no bus coming, I don’t take the bus,” was a sentiment shared by many focus group participants. Very few students reported using the bus to travel multiple miles on a regular basis. Students owning a car reported different uses and distances, but generally used the bus less frequently. Several students who owned cars responded that they do not use their car for campus commuting, but rather for other errands such as shopping or work. Comments about effects of the Class Pass on the surrounding community and environment were infrequent. Most

people either had no comment, or believed there was little or no effect. An example of one positive effect suggested was decreased car use, while an example of one of the negative effects received was poor student-community relations on the buses near campus: “Students are not always aware of other non-student patrons using the bus; for example, not getting up to give up a seat to an elderly person... bus drivers are usually pretty rude to/resentful of college students, who sometimes are acting pretty rudely/inconsiderately themselves.”

The surveys distributed by UC Berkeley Parking and Transportation also provided some data on the primary modal choices students made before and after the institution of the Class Pass. Figure 1 shows a small increase in busing and even smaller decrease in driving after the institution of the Class Pass in 1998. Walking and biking were largely unaffected by the Class Pass, although there seems to be a decreasing trend for biking which started before institution of the Class Pass, possibly as a result of theft.

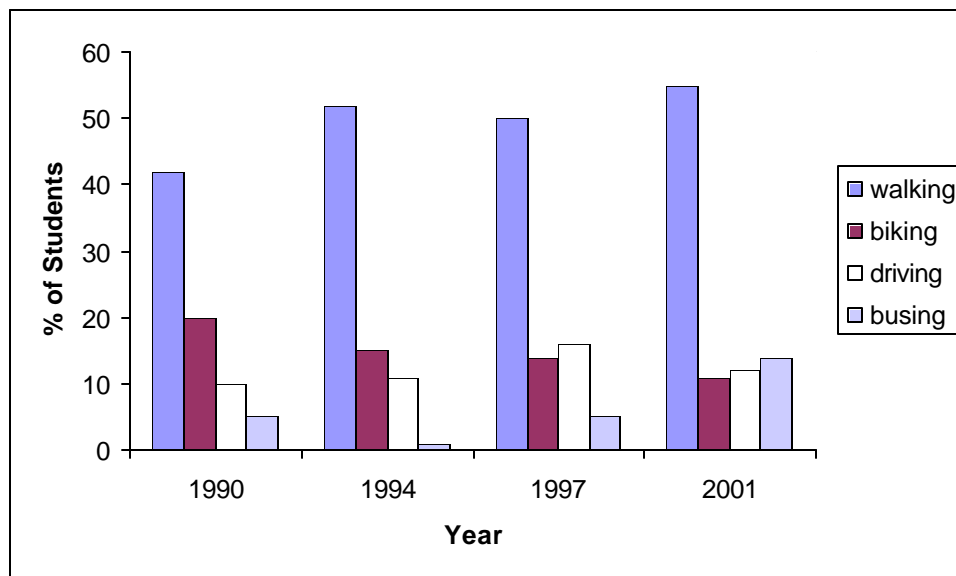


Figure 1. Primary Modal choices of UC Berkeley students, as reported in 2001 Class Pass survey, out of 5,185 students.

To understand the sampling population for the surveys, the number of registered students and those who actually pick up the pass are displayed in Table 4. These numbers also provide insight into the percent of students taking advantage of this service.



	2001	2002	2003	2004
# Registered Students	32,128	33,145	33,076	32, 814
# Picking up Pass	21,800	28,081	28,295	28,313
% Having and Using Class Pass	81.3%	85.1%	-----	-----
% Returning Survey	29%	60%	-----	-----

Table 4. UC Berkeley Students picking up and using the Class Pass with total number of registered UC Berkeley students.

Table 4 shows that during the past 3 years about 85% of students have been picking up their Class Pass stickers, and that the majority of the people who responded to the survey ride the bus at least once a week (8,183 in 2001 and 17,097 in 2002). Survey data for 2003 and 2004 was unavailable, but similar results could be expected.

To determine the effects on the environment, as well as the costs of the vehicular modes of transportation to students, AC Transit, and to some extent the community, the average yearly costs of a car and a bus were collected from various sources. Both are provided in Table 5.

	Bus	Car
Hydrocarbons (pounds/year)	123	77.1
Carbon Monoxide (pounds/year)	919	575
Oxides of Nitrogen (pounds/year)	2465	38.2
Carbon Dioxide (pounds/year)	185,197	11,450

Table 5. Average costs to the environment and community of using a bus and a car for one year.

To further discern the effect of the Class Pass on AC Transit, the community, and the students, the change in bus lines resulting from increased income from the student body was examined. The primary bus lines affecting the student population, which are recorded in Table 6, were analyzed based on reported use in the Parking and Transportation surveys. No interesting trends were found for changes in number of buses or service routes after the institution of the Class Pass. Interviews with bus drivers indicated that there was not enough of a difference in quantity of buses for a clear preference for student routes to be established, and no new lines catering to student needs have been created.

Bus Line	% of total responses out of 5,185
7	9
40/40L	10
51	22
52	11
52L	9
64	6
43	6
F	8

Table 6. Most frequently used bus lines by UC Berkeley students, averaged from survey responses for 2001, 2002, and 2003. Very little difference in bus line usage over the three years.

A summary of the results is provided in Table 7, showing which elements proved to be beneficial for a particular group, which had negative effects, and which were inconsequential.

Students	AC Transit	Environment	Community
+ Willingness to Pay + Convenience - Cost of Bus Use + Cost of Car Use	+ Class Pass Income 0 Cost of Extra Buses - Fraud	+ Change in Car Use 0 Change in Bus Use	+ Change in Emissions 0 Change in Amount of Service - Atmosphere Created by Students

Table 7. Qualitative depiction of which factors positively and negatively affected the value to stakeholder groups, or had no influence.

**Discussion**

In a comparison of the cost of bus versus car use, using the bus rather than a car, and the Class Pass in particular, yields huge cost savings for an individual: choosing any mode over a car saves approximately \$4000 (See Tables 2 and 3). Because UC Berkeley has strict eligibility requirements, few parking spots, and high prices, there is no waiting list for campus parking permits. Many students who commute to school either hold city permits or simply park in metered parking areas. Because of this, estimating the number of students who own a car and the frequency of use could only be found accurately with a campus wide survey. One third of the approximately thirty students that participated in my focus groups owned cars and drove to campus on occasion, but none owned campus parking permits. Despite this, the estimated cost of parking can still be considered reasonable because most students who have a car in Berkeley are still paying to park somewhere, even if not on campus. The actual cost of parking may be

higher than estimated as a result of parking citations, which are a common occurrence on and around campus.

As expected, the focus groups have indicated that the desires and values of the student body are diverse, and do not necessarily have anything to do with the monetary costs of modal choices. While many feel that the convenience of the Class Pass outweighs the amount that it is utilized, a similar number of students felt that it was not worth more than the present cost, where some felt that it is worth the present cost, and some indicated that even the current \$37.40 is cost prohibitive. This is a pressing concern because of the proposed increase to the Class Pass in the coming referendum. If a majority of students voting in the referendum believe that the Class Pass is worth more money, the students who do not use the Class Pass will become increasingly disgruntled. Based on the focus groups, instituting a more expensive, voluntary pass which only interested students would purchase, similar to the faculty and staff Bear Pass, might be a fruitful compromise. If it was still included as a part of the registration fee but with an opt-out option, like the student health insurance policy, the program would maintain its convenience and encourage students to participate.

Because there has been no significant change to bus lines operating around the campus, AC Transit's benefit from the Class Pass seems apparent. They have not increased their base line costs, but they have added an extra \$1.2 million to annual income. The only major source of loss for AC Transit as a result of the Class Pass is in the form of user fraud, because an unknown number of students who do not utilize their Class Pass simply sell it. While AC Transit is still receiving the \$37.40 for the pass that is being used, they would otherwise have received significantly more from a person purchasing monthly passes. For a commuter from San Francisco who would be purchasing monthly Transbay passes, AC Transit would lose over \$1000 in a year from an illegally purchased Class Pass. In one article, AC Transit estimated their losses at as much as \$7 million a year (Brand 2003), which is likely to be an overestimate because AC Transit does still intend to renew the Class Pass program in 2006. If the program was actually resulting in a \$7 million dollar loss per year, it is unlikely that AC Transit would be enthusiastic about perpetuating the program in the future.

Costs and benefits to the environment and community are less clear. Because there has been little change to the service schedules, there is a benefit from the reduced single occupancy vehicle emissions. The Class Pass surveys seem to indicate only a small decrease in car use as a

result of the Class Pass, but as long as more buses are not added, this will result in a corresponding decrease in emissions and traffic. The relations between students and other bus users may be negative in some cases as a result of more crowded conditions around campus and a lack of consideration by some students, but this would be affecting a much smaller proportion of the surrounding community than would the environmental benefits.

Several scenarios could potentially change the balance of costs and benefits for some of the users. If the quantity of walking and biking increased enough that AC Transit decreased the number of buses around campus, there could potentially be positive or negative effects on the value of the Class Pass to any or all of the groups. If student or non-student riders were encouraged to invest in a car as a result of this, it could be a detriment to all groups. There would be increased car costs for students and the community, as well as increased emissions from single occupancy vehicles for the environment. On the other hand, if walking and biking did not spur increased car use, students would benefit from lower registration costs without the Class Pass, and the environment would benefit from lowered emissions. The community would benefit from the environmental and traffic repercussions, but would suffer from the decreased service to the campus area. AC Transit would be likely to lose money in either scenario from decreased users, and would potentially lose more money if the Class Pass was eradicated. The most clearly beneficial scenario would arise from greater reliance on the bus by single occupancy vehicle drivers. In this scenario, all parties benefit as long as the balance of buses and service routes are maintained. If more buses are added than cars are decreased, then emissions could potentially be increased.

Because the focus of other studies, such as the UCLA BruinGo program, has been on net increase of ridership and decrease of parking demand, it is difficult to compare the student benefits with Class Pass program. The ridership statistics are rough at best, and because most Berkeley students do not use campus parking lots when commuting in cars, the campus parking demand is not as useful an indicator as it was for UCLA. In general, the surveys indicate that there are fewer commuters in Berkeley than in the UCLA study, and that Berkeley students do use the transportation system for shorter rides. Some of the benefits to AC Transit and the community do seem to be similar to those studied at UCLA. Both AC Transit and Blue Bus receive a particular fee for use of the system, but if Blue Bus has a problem with fraud on the level that AC Transit does, it is unreported. For the surrounding community, benefits with

increased speed of entry onto the bus are similar for both schools, but student-community relations were not mentioned in the UCLA study, so it is difficult to know if there is a similar amount of tension between students and other bus users. Despite these other benefits, for Berkeley the most reliable indication for success for the program seems to be the willingness of students to pay for the pass, because of the small difference in number of cars and buses as a result of the pass minimizes the effect on the community and the environment. If students value the convenience of pre-paying and taking the bus primarily for short distances, the Class Pass can be seen as beneficial as long as there is no net increase in emissions from increased buses.

There are several uncertainties involved in my study. The Class Pass surveys are of questionable statistical significance and were only provided to students picking up Class Passes. They are more useful in providing a picture of a larger student body population than my focus groups, but because of their limitations, such as only representing the attitudes of those who are picking up their passes, do not stand alone. Other uncertainties stem from the focus groups. While interesting insight can be obtained regarding student attitudes, because of the small sample size, it can not be considered to be a representative sample of the student population. While the diversity of responses in the focus group provided insight into the complexity of the issue, if one or two related questions were added to the biannual survey, it would improve the understanding of student attitudes about the Class Pass. Biases with the focus groups discussed in this paper also include my sample selection, as most of my focus groups were conducted with groups that I am a part of, including ES 196 students and the UC Rally Committee. While I do not believe that having some subjects who know me biased the sample, the groups sampled may have been biased by having similar interests, such as same class level, interest in the environment, or other unexplored biases. From the trends in the focus groups already performed, class level tends to be the largest indicator for direction of response because of proximity to campus and likelihood of owning a car.

Another source of uncertainty came from bus driver interviews, which was a secondary way of obtaining information on bus and service trends when it became clear that collecting data from AC Transit's records was not going to be possible. As a result of this, the actual changes in service routes could not be quantified, because the responses were opinion and observation based, rather than objectively obtained. An analysis of the service route data from the past 8 years could yield different results for the effect of the Class Pass environment and community.

## Acknowledgements

Thanks to Rob Hoffman for providing me with the Class Pass surveys and other Class Pass records, to Nad Permaul for allowing me to attend Class Pass Committee Meetings, to Michelle Ayers for helping me retrieve AC Transit information, to Arielle Levine for all of her guidance and suggestions, and to John Latto, Christina Castanhan, and Mike Dwyer for all of the help that they provided.

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